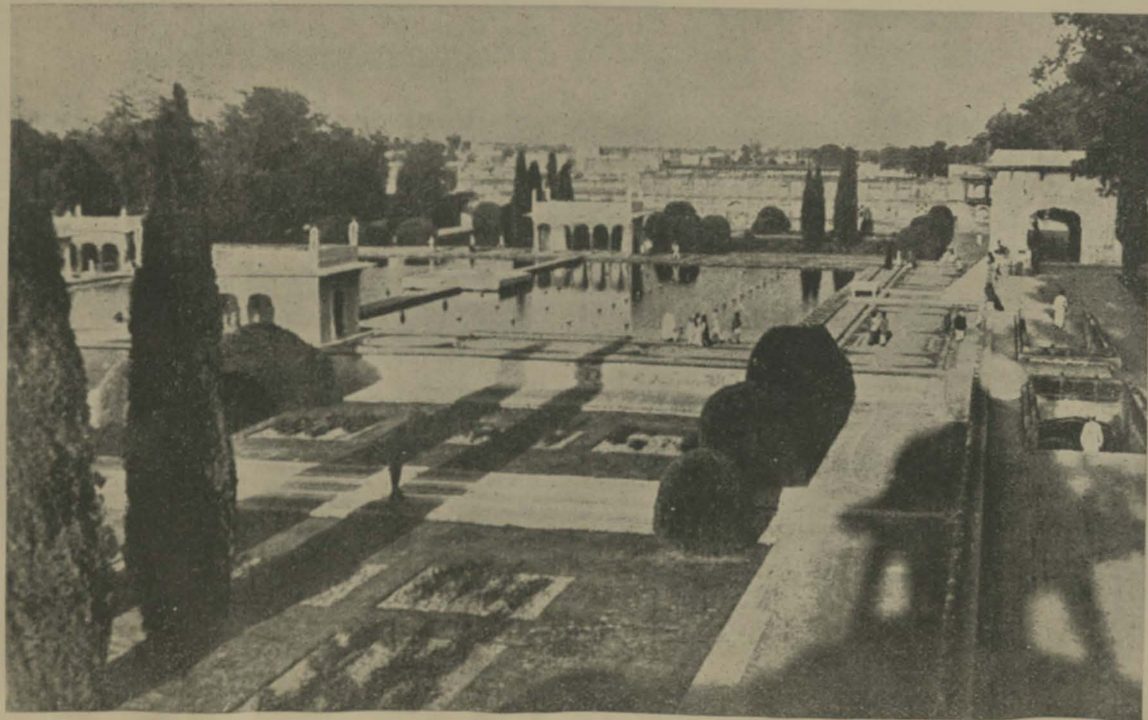


SHALAMAR GARDEN, LAHORE.

HERITAGE
OF
ISLAM

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By

K. JAMIL AHMAD

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FOREWORD

Heritage of Islam is a collection of articles contributed from time to time by Khwaja Jamil Ahmad to the various journals of Pakistan.

These articles are now being published in a book form. I welcome the publication as I think the book will serve as a fine introductory study for the average reader. It will also be useful to the students of Islamic History.

Various cultural aspects of Islam have been competently dealt with by the author. This work should stimulate interest in the cultural history of Islam.

MAHMUD HUSAIN

Professor and Head of the Department of History and Dean, Faculty of Arts,
Ex-*Minister for Education, Government of Pakistan*

INTRODUCTION

Hon'ble Z. H. Lari, Judge, West Pakistan High Court.

Khwaja Jamil Ahmad, B.A. (Hons.), is the author of the articles which have been compiled in the form of this book known as *Heritage of Islam.* Mr. Jamil hails from District Fyzabad, once the seat of Oudh grandeur and greatness and migrated to Pakistan along with lacs of others after the establishment of our homeland. He was connected with *Daily Star*, Allahabad as Assistant Editor for about two years and has contributed to various leading Periodicals and Dailies of Indo-Pakistan on matters connected with Islamic History and Culture. These articles show that Mr. Jamil wields a facile pen and has drunk deep from the forgotten fountains of Muslim Civilization. The diversity of the subjects dealt by him in this book amply bring out his hold on Islamic Culture and Learning.

Muslim Civilization has become taboo in the homeland which was created to consolidate and foster it. What an irony of fate! The British have departed but we are still slaves of British forms, rituals and language. And add to it, Americanism has become hot favourite and has begun to grip our intellect. All that is fine and sublime in Indo-Muslim Culture

is fast disappearing and may become extinct unless the present trends are immediately arrested, controlled and properly directed.

It is time that we are taught that it is Islam which heralds social democracy, lays the foundation of representative government and sows the seeds of socialistic society. It is time that we realized that it is Islam which generated scientific approach and threw up men who, by their works and deeds, paved the way for modern inventions, scientific discoveries, humane civilization and modern outlook. Mr. Jamil's articles throw light on such men and their performances. I commend them to the public.

This book, dealing with the cultural heritage of Islam and the debt which the modern civilization owed to Muslim thinkers would, in my opinion, go a long way in clearing the vision of our educated class clouded with the much propagated achievements of the West.

Karachi.
July 18, 1955.

Z. H. Lari

PREFACE

Of all the great nations of the world that have contributed to the building of human civilization, none perhaps, has wielded the sword and the pen with equal success than the Arabs. The teachings of the Holy Prophet of Islam knit together into Islamic brotherhood the warring Arab Tribes, who, thus formed into an irresistable force, swept over the three known continents, weeding out corruption and evils wherever they went, and founded a healthier society based on equality, fraternity and justice. The nomadic Arabs, who rose from their desert tents, founded in remarkably short time, the mightiest Empire of the Mediaeval era, which stretched from the shores of the Atlantic in the west to the Highlands of Pamir in the East. Their success in the field of territorial conquests was no more spectacular than their success in the realm of knowledge. In fact they brought about the greatest revolution in the history of Mankind—a revolution which embraced all branches of human activity. The memorable words of the Holy Prophet of Islam, "Go in quest of knowledge even unto the distant China", awakened a love of learning and a spirit of enquiry among the Arabs, which, hitherto lay dormant in them. The Muslims, who soon distinguished themselves as the pioneers in diverse branches of knowledge during the Mediaeval times provided the necessary link between the ancient

and modern civilizations. The light of knowledge which illuminated the lands of 'Moors' in Spain and Sicily was greatly instrumental in dispelling the gloom that had enveloped the Mediaeval Europe.

The intellectual treasures of the Arabs amassed after centuries of intellectual pursuits were reduced to ashes by Hulagu Khan the Mongol, on the fall of Baghdad and by the Crusaders in the Holy land. There are, of course, a few noble exceptions in the persons of the broadminded emperor Frederick II and the Norman Kings of Sicily who openly patronised Saracenic art and culture despite violent protests by the Church. The few books which survived were translated into several European languages and in fact led to the intellectual awakening of the West. Western historians for a considerably long period, hesitated to acknowledge the debt which the Modern Civilization owed to Muslims and till the beginning of the 18th Century the factors which brought about the Renaissance in Europe were shrouded in mystery. But the modern historical research lifted the curtain hung over the intellectual attainments of Muslims and revealed them in all their glory. The western orientalists like Gibbon, Lane Poole, Robert Briffault, Von Kramer, Max Meyerhof, Carra De Vaux, H. G. Farmer, Philip K. Hitti, George Sarton and many others gratefully acknowledged the part played by Muslims in the advancement of sciences and arts.

The reasons which prompted me to write this book are manifold. The glamour of western civiliza-

tion has so much dazzled our eyes and clouded our vision that we can hardly look beyond our limited horizon and see the glorious Muslim civilization which prevailed during the Mediaeval times. An average educated person in the East knows a lot about Shakespeare and Milton, Plato and Aristotle, Newton and Stephenson, Marconi and Darwin but he hardly knows anything about Saadi and Firdausi, Ghazali (Alghazel) and Farabi (Al-Farabes), Razi (Rhazes) and Khwarizmi, Kindi and Ibn Sina (Avicenna), Ibn Rushd (Averroes) and Ibn Khaldun. The defective system of education prevalent in the sub-continent since the commencement of British Rule and the paucity of the standard books on Islamic subjects were, to a great extent, responsible for this estrangement towards the cultural heritage of Islam. The achievements of Muslim thinkers are scattered in hundreds of books, not easily available in the libraries of the East. The present book is only a humble attempt to present the intellectual and cultural heritage of Islam in a simple and concise form.

The subjects dealt in this book embrace all branches of Islamic learning including sciences and arts, philosophy and economics, education and sociology, history and geography to which Muslims have made lasting contributions.

This volume is a collection of articles published from time to time in the leading papers and periodicals of Pakistan. Hence, in a work of this type in which each chapter is complete by itself, one may come across

overlapping of subject matter and the same authors might have been discussed more than once.

The reader will come across a novel feature in this book. I have purposely preferred to include quotations from the western writers in order to convince the westernised class of people of the achievements of the Muslim thinkers, which otherwise, would not have been easily believed and accepted.

In the end, I offer my sincere thanks to the Editors of *Dawn*, *Karachi Times*, *Pakistan Standard*, *Morning News*, *Pakistan Review*, *Voice of Islam*, *Sind Observer* and *Eastern Express* for permitting the reproduction of these articles published in their esteemed journals and periodicals. I am also thankful to U. S. I. S. authorities who have permitted the publication of a few talks broadcast by the *Voice of America*. Some of the photos used for illustrating the book were supplied by the Indian High Commission, Embassy of Spain and Embassy of Iraq stationed at Karachi and I am much thankful to them.

Last but not the least I am immensely grateful to Dr. Mahmud Husain, Professor of History and Dean of the Faculty of Arts, University of Karachi, who was kind enough to go through the typescript of the book and gave some useful suggestions which have been carried out. I am extremely thankful to Hon'ble Z. H. Lari, Judge West Pakistan High Court, who has added a learned and illuminating Introduction to this book. I also owe thanks to Messrs K. A. Waheed, Yusuf Qureshi and J. A. Kidwai without

whose help and encouragement, it would have been difficult for me to overcome many insurmountable difficulties.

This book, I am sure, will serve a useful purpose in broadening the vision of an average reader and will acquaint him with the many-sided development of Islamic arts and architecture, sciences and philosophy during the Mediaeval Times.

KARACHI: K. J. AHMAD
May, 1955

THE ORIGIN OF ISLAMIC LEARNING

Arabia, the birth-place of Islam was a land inhabited by warring tribes, who were exploited economically and subjugated politically by the Persians and the Romans. The practical teachings of the great Prophet of Islam brought about a complete reorientation in their outlook towards life and gave birth to one of the greatest revolutions in history. Arabs, knit together by the strong bonds of Islamic brotherhood, became an irresistible force whose arms held sway over three continents and who became the masters of a third of the known world in the short period of 30 years. The great Roman and Persian Empires lay tottering before their invincible armed might.

The success of the Arabs in the intellectual field was no less remarkable than their success on the battle-field, and the teachings of the Holy Prophet infused a spirit of civility, culture, piety, justice and forbearance into a savage race and inspired their hearts with a love of knowledge. According to Ameer Ali, "Afflicted humanity awoke into new life. Whilst the barbarians of Europe, who had overturned an effete empire, were groping in the darkness of ignorance and brutality, the Muslims were building up a great civilisation. During centuries of moral and intellectual desolation in Europe, Islam led the vanguard of progress."[1] The Prophet who always

[1]Spirit of Islam—Ch. IX.

emphasised the need for learning is alleged to have said that the 'ink of the scholar is more holy than the blood of the martyr', and repeatedly impressed upon his followers the necessity for "seeking knowledge even unto China."[1] He said, "He who leaves his home in search of knowledge walks in the path of God."[2] The exhortations of the great Prophet had a salutary effect on his followers and evoked in them a love of knowledge which in a short time made them the pioneers in the world of the sciences and arts. "Science and literature possessed no votaries," says a celebrated historian. "But the words of the Prophet gave a new impetus to the awakened energies of the race......Even within his life-time was formed the nucleus of an educational institution, which in after years grew into universities at Baghdad and Salerno, at Cairo and Cordova."[3]

The family members of the Holy Prophet formed the vanguard in the pursuit of learning and produced some of the eminent scholars of early Islam. Hazrat Ali, according to the Prophet was the door of the house of knowledge. He was the greatest Jurist, Theologian and Religious philosopher during the Caliphate "Raashidah" (Right-guided Caliphs). All complicated cases were referred to him and he was considered the final authority in such matters. He lectured on the branches of learning most suited to the wants of the infant Commonwealth. Among his recorded sayings are: "Eminence in science is

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[1]Misbah-us-Shariyat; Spirit of Islam—Ch. IX.
[2]Jami-al-Akhbar; Spirit of Islam—Ch. IX.
[3]Spirit of Islam—Ch. IX.

the highest of honours." "He dies not who gives life to learning." "The greatest ornament of a man is erudition."[1] Ibn Abbas, his cousin delivered public lectures on poetry, grammar, history and mathematics. The children of Fatimah believed in the pursuits of learning and some of the most outstanding scholars and theologians of the age including Imam Jafar Sadiq and Musa Kazim were Fatimids.

Contrast

The Christian hatred for learning from 700 to 1200 A. D., served as a striking contrast to the great Islamic advancement in the field of the sciences and arts. The light of learning was burning profusely in the Islamic domains at a time when European countries were enveloped in the darkness of savagery. "From the fourth century of the Christian era to the 12th," says Ameer Ali, "the gloom that overshadowed Europe grew deeper and deeper. During these ages of ferocious bigotry, Ecclesiasticism barred every access through which the light of knowledge, humanity, or civilisation could enter.[2] "Under Constantine and his orthodox successors, the Aesclapians were closed for ever; the public libraries established by the liberality of the pagan emperors were dispersed or destroyed, learning was 'branded as magic and punished as Treason', and philosophy and science were exterminated. The ecclesiastical hatred against human learning had found expression in the Patristic maxim, 'Ignorance is the mother of devotion', and

[1]Spirit of Islam—Ch. IX.
[2]Spirit of Islam—Ch. IX.

Pope Gregory the Great, the founder of ecclesiastical supremacy, gave effect to this obscurantist dogma by expelling from Rome all scientific studies, and burning the Palatine Library founded by Augustus Caesar. He forbade the study of the ancient writers of Greece and Rome."[1] Even the Christian chroniclers bear testimony to the great apathy of the Christian west towards the advancement of knowledge and ascribe it to the non-co-operation of the Church. Max Kahn in chapter II of *The Practice of Medicine*, Vol. I, says: "Everything pagan was forgotten, the clergy discouraged the study or the possession of books written by the ancient Greeks and Romans. They held in abomination their sculptures and their works of arts, their rhetorical lectures and philosophical speculations....worldly joys, earthly beauty, sensuous pleasures, pagan learning, metaphysical discussions were all abhorred as temptation of the devil. It was dangerous to know too much."

The teachings of the Holy Prophet of Islam had enshrined in the hearts of the Arabs veneration for learned people and respect for the places of worship and learning. The conquering armies of the nomadic Arabs not only spared the libraries, churches and intellectuals of the alien faith, but advanced all sorts of patronage to them. "When the Arabs overran North Africa and Western Asia," says Max Meyerhof, "they left the Byzantine and Persian administrative and scientific institutions almost untouched. The academy of Jundeshapur continued as the scientific centre of the New Islamic Empire."[2] Arab liberalism presents a

[1] Spirit of Islam—Ch. IX.
[2] Legacy of Islam, page 314.

striking contrast to the western hatred for learning. The fantastic story advanced by the Christian historians regarding the burning of the Alexandrian Library by the Arab conquerors does not stand the test of historical research as it has been fully established through historical records that the said library was laid to ashes by the Romans in the days of Julius Caesar, centuries before. Ameer Ali, the well known author of the "Spirit of Islam", says, "They (Christian crusaders) destroyed the splendid library of Tripoli without compunction; they reduced to ashes many of the glorious centres of Saracenic culture and arts. Christian Europe has held up to obloquy the apocryphal destruction of the Alexandrian library, which had already been burned in the time of Julius Caesar, but it has no word of blame for the crimes of her Crusaders five centuries later." Philip K. Hitti writes, "The story that by the Caliph's order 'Amr for six long months fed the numerous bath furnaces of the city with the volumes of the Alexandrian Library is one of those tales that make good fiction but bad history. The great Ptolemaic Library was burnt as early as 48 B.C. by Julius Caesar."[2] The Christian crusaders played havoc with all the relics of Islam and destroyed everything which was Islamic in character including the great library of Tripoli. The Muslims had built up a great civilization in Spain, thereby dispelling the gloom that had enveloped Europe. The Christian pupils who sat at the feet of learned teachers like

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[1]Spirit of Islam, Ch. IX.

[2]Philip K. Hitti History of the Arabs, page 166.

Averroes and Ibn Khaldun were responsible for advancing the cause of knowledge in mediaeval Europe. Unfortunately internal conflicts brought about the doom of the Muslim Kingdom in Spain and the conquering Christians effaced all traces of Islamic culture and learning from their native soil. "The Muslims had turned Spain into a garden;" says an eminent writer, "the Christians converted it into a desert. The Muslims had covered the land with colleges and schools; Christians converted them into churches for the worship of saints and images. The literary and scientific treasures amassed by the Muslim sovereigns were consigned to the flames."[1]

The destruction of Baghdad by Hulagu Khan, the Mongol, in 1258 A. D., was the greatest calamity that befell the Muslim world and served as a death blow to all intellectual enterprises. It reduced to ashes the invaluable cultural treasures of Islam including the rare manuscripts of the great Arabian intellectuals collected in the libraries of Baghdad during the preceding five centuries.

Preparations

The Abbasid Caliphate provided the most congenial atmosphere for the growth of the sciences and arts. Al-Mansur was the first Abbasid Caliph who ordered the translation of books from foreign languages into Arabic. He himself being a good scholar and mathematician patronised men of letters who

[1]Spirit of Islam, Ch. IX.

flocked to his court to continue their literary pursuits in an atmosphere free from all cares and anxieties. Mansur had translated into Arabic *Hitopadesa* (Indian Fables), *Sidhanta* (Indian treatise on astronomy), *Almagest* of Ptolemy, several works of Aristotle, books of Euclid and a large number of other Greek, Byzantine, Persian and Syrian works. 'Each nation of the world had its golden age—Athens had the Periclean era; Rome the Augustan age; while Islam had its period of intellectual glory extending from the accession of Mansur to the death of Mutazid—a period comprising the reign of six Caliphs. During the most brilliant of these, the Caliphate of Al-Mamun, Muslims formed the vanguard of civilization.' Caliph Mamun (813—833 A.D.) established in Baghdad a school of translation known as *Darul Hukama* (House of wisdom) in which Humayun bin Ishaq was the dominant figure. The generous patronage of the enlightened Caliph drew to his court a galaxy of talented scholars from all corners of the known world. During his time and that of his illustrious father, Harun-ar-Rashid 'every part of the globe was ransacked by the agents of the Caliphs for the hoarded wealth of antiquity.' Mamun undoubtedly deserved the title of 'Augustus' of the Arabs. He was followed by a brilliant succession of princes who continued his work. The main contribution of Mamun to the advancement of Arabian knowledge lies in the enormous translation work undertaken during his reign which paved the way for the later outstanding achievements of Muslim scholars and scientists. Actually he established the firm foundation

on which the majestic and imposing edifice of Islamic thought was built.

Of all the dozens of translators serving during the reign of Mamun, Humayun bin Ishaq (809—873 A. D.) occupies the most eminent place. He had ninety pupil translators working under him and several well known contemporary translators of various languages attached to him. Amongst these his nephew Hubaysh, his son Ishaq (d/910 A. D.), the mathematician Thabit bin Qurra (825—901 A. D.) and Qusta bin Luqa acquired great fame. Humayun is the author of the famous "*Missive*" which contains the translations of the immense corpus of Galenic writings—amounting to 100 Syriac and 39 Arabic versions of Galens' medical and philosophical works. The work of translation was pursued with utmost vigour and Humayun and his family played an important part in translating *Categories*, *Physics* and *Magna Moralia* of Aristotle; the *Republica*, *Law and Timacus* of Plato. The "House of Wisdom," mainly concerned with the work of translation ceased to exist after the death of Mamun, its great patron. About 856 A. D. Mutawakkil refounded in Baghdad the library and translation school of which Humayun was made the director.

Patronage

The Muslim rulers and their Amirs patronised learning and had the greatest respect for learned men who were always welcomed in their societies. Some of the more enthusiastic monarchs vied with each

other in drawing to their court the largest number of intellectuals. Even the notorious tyrant Hajjaj bin Yusuf was a good mathematician and a well known patron of men of letters. Of all the dignitaries of Islam the first six Caliphs of the Abbasid Caliphate stand out as the greatest patrons of learning and were instrumental in raising Islamic knowledge to the summit of its glory.

The rise of Cairo under Al-Muiz li-din-illah produced a rivalry among the Caliphs of the Houses of Abbas and Fatimah regarding patronage of learning. Al-Muiz is known as the Mamun of the West.

Mahmud Ghaznavi and his son Masud were great patrons of learning whose generosity drew to their court such intellectual giants as Al-Beruni, the versatile genius, Firdausi, the immortal poet, Dakiki and Unsari. Mahmud is said to have offered sixty thousand gold coins to Firdausi for his world famous "*Shah-Nama*" and Masud had bestowed an elephant load of silver to Al-Beruni for his celebrated astronomical work *Qanun-al-Masudi*.

The rise of the Saljuqs and their munificence towards the scholars who flocked to their court rivalled that of the golden days of the Abbasids. Tughril, Alp Arsalan, Sanjar and above all Malik Shah were great patrons of learning. Khwaja Hasan Nizamul-Mulk Toosi, the illustrious Vazier of Malik Shah drew around him the intellectual gems of the Islamic world including astronomers, poets, theologians, mathematicians, scientists and historians.

Even the so-called savage Taimur (Tamerlane) collected the cultural heritage of Islamic Dominions in his capital, Samarqand, and his vast system of colonisation filled the big cities of central Asia, especially Samarqand, with intellectuals. Such talented scholars as Jami, the master of sciences, Suhaili, the translator of Pilpay and Ali Sher Anwar adorned the literary meetings of Tamerlane. Ulugh Khan, a grandson of Taimur, and a well known astronomer, enhanced the intellectual glory of Samarqand.

The Moorish kings of Spain and the Mughal emperors of India did not lag behind others in encouraging the pursuits of the sciences and arts in their dominions and such intellectuals as Averroes, Ibn Khaldun, Faizi and Abul Fazl found a congenial atmosphere in their durbars for the pursuits of their scientific and literary research.

Thus the teachings of the Holy Prophet of Islam bore fruit and the Arabs distinguished themselves as the torch-bearers of civilization, knowledge and culture in the world and ultimately dispelled the gloom which had enveloped Mediaeval Europe.

SCIENCES

The Arabs who had wielded the arms with such remarkable success, that they had become the masters of a third of the known world in a short span of thirty years, met with even greater success in the realm of knowledge. But the west has persistently endeavoured to under-rate the achievements of Islam. Writing in his outspoken book *The Intellectual Development of Europe*, John William Draper says, "I have to deplore the systematic manner in which the literature of Europe has contrived to put out of sight our scientific obligations to the Mohammadans. Surely they can not be much longer hidden. Injustice founded on religious rancour and national conceit cannot be perpetuated for ever. What should the modern astronomer say, when, remembering the contemporary barbarism of Europe, he finds the Arab Abul Hassan speaking of turbes, to the extremities of which ocular and object diopters, perhaps sights, were attached, as used at Meragha? What when he reads of the attempts of Abdur Rahman Sufi at improving the photometry of stars? Are the astronomical tables of Ibn Junis (A. D. 1008) called the Hakemite tables, or the Ilkanic tables of Nasir-ud-din Toosi, constructed at the great observatory just mentioned, Meragha near Tauris (1259 A. D.), or the measurement of time by pendulum oscillations, and the method of correcting astronomical tables by systematic observations—

are such things worthless indications of the mental state? The Arab has left his intellectual impress on Europe, as, before long, Christendom will have to confess; he has indelibly written it on the heavens, as any one may see who reads the names of the stars on a common celestial globe."[1]

What is Science?

Science, has been defined as, "the ordered knowledge of natural phenomena and the relations between them. Its end is the rational interpretation of the facts of existence as disclosed to us by our faculties and senses." The celebrated scientist Sir J. Arthur Thomson considers science to be "the well criticised body of empirical knowledge declaring in the simplest and tersest terms available at the time what can be observed and experimented with, and summing up uniformities of change in formulae which are called laws verifiable by all who can use the methods."[2] According to another well known scientist Karl Pearson the hypotheses of science are based on "observed facts, which, when confirmed by criticism and experiment, are turned into laws of Nature."

Experimental Method

Observation and experiment are the two sources of scientific knowledge. Aristotle was the father of the Greek sciences, and has made a lasting contribution to physics, astronomy, biology, meteorology and other sciences. The Greek method of acquiring scientific

[1]Intellectual Development of Europe (Vol. II, page 42).
[2]"The *Grammar of Science*", by Sir J. Arthur Thomson.

knowledge was mainly speculative, hence science as such could make little headway during the time of the Greeks.

The Arabs who were more realistic and practical in their approach adopted the experimental method to harness scientific knowledge. Observation and experiment formed the vehicle of their scientific pursuits, hence they gave a new outlook to science of which the world had been totally unaware. Their achievements in the field of experimental science added a golden chapter to the annals of scientific knowledge and opened a new vista for the growth of modern sciences. Al-Ghazali was the follower of Aristotle in logic, but among Muslims, Ishraqi and Ibn-i-Taimiyya were first to undertake the systematic refutation of Greek logic. Abu Bakr Razi criticised Aristotle's first figure and followed the inductive spirit which was reformulated by John Stuart Mill. Ibn-i-Hazm in his well known work *Scope of Logic* lays stress on sense perception as a source of knowledge and Ibn-i-Taimiyya in his *Refutation of Logic* proves beyond doubt that induction is the only sure form of argument, which ultimately gave birth to the method of observation and experiment. It is absolutely wrong to assume that experimental method was formulated in Europe. Roger Bacon, who, in the west is known as the originator of experimental method in Europe, had himself received his training from the pupils of Spanish Moors, and had learnt everything from Muslim sources. The influence of Ibn Haitham on Roger Bacon is clearly visible in his works. Europe was very slow to recognise the

Islamic origin of her much advertised scientific (experimental) method. Writing in the *Making of Humanity* Briffault admits, "It was under their successors at the Oxford School that Roger Bacon learned Arabic and Arabic science. Neither Roger Bacon nor his later namesake has any title to be credited with having introduced the experimental method. Roger Bacon was no more than one of the apostles of Muslim science and method to Christian Europe; and he never wearied of declaring that the knowledge of Arabic and Arabic science was for his contemporaries the only way to true knowledge. Discussions as to who was the originator of the experimental method......are part of the colossal misrepresentation of the origins of European civilization. The experimental method of Arabs was by Bacon's time widespread and eagerly cultivated throughout Europe....Science is the most momentous contribution of Arab civilization to the modern world, but its fruits were slow in ripening. Not until long after Moorish culture had sunk back into darkness did the giant to which it had given birth, rise in his might. It was not science only which brought Europe back to life. Other and manifold influences from the civilisation of Islam communicated its first glow to European life. For although there is not a single aspect of European growth in which the decisive influence of Islamic culture is not traceable, nowhere is it so clear and momentous as in the genesis of that power which constitutes the permanent distinctive force of the modern world, and the supreme source of its

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[1]Making of Humanity, page 202.

victory—natural science and the scientific spirit... The debt of our science to that of the Arabs does not consist in startling discoveries or revolutionary theories; science owes a great deal more to Arab culture, it owes its existence....The ancient world was, as we saw, pre-scientific. The astronomy and mathematics of Greeks were a foreign importation never thoroughly acclimatized in Greek culture. The Greeks systematised, generalised and theorised, but the patient ways of investigation, the accumulation of positive knowledge, the minute methods of science, detailed and prolonged observation and experimental enquiry were altogether alien to the Greek temperament. Only in Hellenistic Alexandria was any approach to scientific work conducted in the ancient classical world. That spirit and those methods were introduced into the European world by the Arabs."[1] In his outstanding work *The Reconstruction of Religious Thought in Islam*, Dr. M. Iqbal, the poet of Islam writes, "The first important point to note about the spirit of Muslim culture then is that for purposes of knowledge, it fixes its gaze on the concrete, the finite. It is further clear that the birth of the method of observation and experiment in Islam was due not to a compromise with Greek thought but to prolonged intellectual warfare with it. In fact the influence of Greeks who, as Briffault says, were interested chiefly in theory, not in fact, tended rather to obscure the Muslim's vision of the Quran, and for at least two centuries kept the practical Arab temperament from asserting itself and coming to its

[1]Making of Humanity, page 190.

own."[1] Thus the experimental method introduced by the Arabs was responsible for the rapid advancement of science during the mediaeval times.

Chemistry

Chemistry as a science is unquestionably the invention of the Muslims. It is one of the sciences in which Muslims have made the greatest contribution and developed it to such a high degree of perfection that they were considered authorities in this science until the end of the 17th century A. D. Jabir and Zakariya Razi have the distinction of being the greatest chemists the mediaeval times produced. Writing in his illuminating *History of the Arabs*, Philip K. Hitti acknowledges the greatness of Arabs in this branch of science when he says, "After materia medica, astronomy and mathematics, the Arabs made their greatest scientific contribution in chemistry. In the study of chemistry and other physical sciences, the Arabs introduced the objective experiment, a decided improvement over the hazy speculation of Greeks. Accurate in the observation of phenomena and diligent in the accumulation of facts, the Arabs nevertheless found it difficult to project proper hypotheses."[2]

Jabir Ibn Hayyan (Geber) who flourished in Kufa about 776 A. D. is known as the father of modern chemistry and along with Zakariya Razi, stands as the greatest name in the annals of chemical science

[1]Reconstruction of Religious Thought in Islam, page 131.
[2]History of the Arabs, page 380.

during mediaeval times. He got his education from Omayyad Prince Khalid Ibn Yazid Ibn Muawiyah and the celebrated Imam Jafar al-Sadiq. He worked on the assumption that metals like lead, tin and iron could be transformed into gold by mixing certain chemical substances. It is said that he manufactured a large quantity of gold with the help of that mysterious substance and two centuries later, when a street was rebuilt in Kufa a large piece of gold was unearthed from his laboratory. He laid great emphasis on the importance of experimentation in his research and hence he made great headway in chemical science. Western writers credit him with the discovery of several chemical compounds, which are not mentioned in his twenty-two extant Arabic works. According to Max Meyerhof "His influence may be traced throughout the whole historic course of European alchemy and chemistry."[1] He is credited, with the writing of 100 chemical works. "Nevertheless, the works to which his name was attached" says Hitti, "were after the 14th century, the most influential chemical treatises in both Europe and Asia."[2] He explained scientifically the two principal operations of chemistry, calcination and reduction, and registered a marked improvement in the methods of evaporation, sublimation filtration, distillation and crystallization. Jabir modified and corrected the Aristotelian theory of the constituents of metal, which remained unchanged until the beginning of modern chemistry in the 18th century. He has

[1]Legacy of Islam, page 327.

[2]History of the Arabs, page 381.

explained in his works the preparation of many chemical substances including "Cinnabar" (sulphide of mercury) and arsenic oxide. It has been established through historical research that he knew how to obtain nearly pure vitrilos, alums, alkalis and how to produce 'the so-called liver' and milk of sulphur by heating sulphur with alkali. He prepared mercury oxide and was fully conversant with the preparation of crude sulphuric and nitric acids. He knew the method of the solution of gold and silver with this acid. His chemical treatises on such subjects have been translated into several European languages including Latin and several technical scientific terms invented by Jabir have been adopted in modern chemistry. A real estimate of his achievements is only possible when his enormous chemical work including the *Book of Seventy* are published. Richard Russell (1678, A. D.) an English translator ascribes a book entitled *Sun of Perfection* to Jabir. A number of his chemical works have been published by Berthelot. His books translated into English are the *Book of Kingdom*, *Book of Balances* and *Book of Eastern mercury*. Jabir also advanced a theory on the geologic formation of metals and dealt with many useful practical applications of chemistry such as refinement of metals, preparation of steel and dyeing of cloth and leather, varnishing of waterproof cloth and use of manganese dioxide to colour glass.

Jabir was recognised as the master by the later chemists including al-Tughrai and Abu al-Qasim al-Iraqi who flourished in the 12th and 13th centuries respectively. These Muslim chemists made little

improvement on the methods of Jabir. They confined themselves to the quest of the legendary elixir (*aliksir*) which they could never find.

Zakariya Razi known as Rhazas in Latin is the second great name in mediaeval chemical science. Born in 850 A. D. at Rayy, he is known as one of the greatest physicians of all times. He wrote *Kitab al Asrar* in chemistry dealing with the preparation of chemical substances and their application. His great work on the art of alchemy was recently found in the library of an Indian Prince. Razi has proved himself to be a greater expert than all his predecessors, including Jabir, in the exact classification of substances. His description of chemical experiments as well as their apparatus are distinguished for their clarity which were not visible in the writings of his predecessors. Jabir and other Arabian chemists divided mineral substances into bodies (gold, silver etc.), souls (sulphur, arsenic, etc.) and spirits (mercury and sal-ammoniac) while Razi classified his mineral substances as vegetable, animal and mineral.

The mineral substances were also classified by Al-Jahiz. Abu Mansur Muwaffaq has contributed to the method of the preparation and properties of mineral substances. Abul Qasim who was a renowned chemist prepared drugs by sublimation and distillation. High class sugar and glass were manufactured in Islamic countries. The Arabs were also expert in the manufacture of ink, lacquers, solders, cements and imitation pearls.

Physics

The Holy Quran had awakened a spirit of enquiry among the Arabs which was instrumental in their splendid achievements in the field of science, and according to a western critic led them to realise that "science could not be advanced by mere speculation; its only sure progress lay in the practical interrogation of nature. The essential characteristics of their method are experiment and observation. In their writings on Mechanics, hydrostatics, optics, etc., the solution of the problem is always obtained by performing an experiment, or by an instrumental observation. It was this that made them the originator of chemistry, that led them to the invention of all kinds of apparatus for distillation, sublimation, fusion and filteration; that in astronomy caused them to appeal to divided instrument, as quadrant and astrolabe; in chemistry to employ the balance the theory of which they were perfectly familiar with; to construct tables of specific gravities and astronomical tables, that produced their great improvements in geometry and trigonometry."[1]

The Muslims developed physics to a high degree and produced such eminent physicist as Kindi, Jahiz, Banu Musa, Beruni, Razi and Abdur Rahman Ibn Nasr.

Abu Yusuf Ibn Ishaq, known as al-Kindi was born at Kufa in the middle of the 9th century and flourished in Baghdad. He is the most dominating

[1] "*Martyrdom of Man*" by Winwood Reade.

figure and one of the greatest Muslim scholars of physics. Over and above this, he was an astrologer, philosopher, alchemist, optician and musical theorist. He wrote more than 265 books, the majority of which have been lost. Most of his works which survived are in Latin having been translated by Gerard of Cremona. Of these fifteen are on meteorology, several on specific weight, on tides, on optics and on reflection of light, and eight are on music. His optics influenced Roger Bacon. He wrote several books on iron and steel to be used for weapons. He applied mathematics not only to physics, but also to medicine. He was therefore regarded by Cardon, a philosopher of the Renaissance, "as one of the 12 subtlest minds." He thought that gold and silver could only be obtained from mines and not through any other process. He endeavoured to ascertain the laws that govern the fall of bodies. Razi investigated on the determination of specific gravity of means of hydrostatic balance, called by him *Mizan-al-Tabii.* Most of his works on physics, mathematics, astronomy and optics have perished. In physics his writings deal with matter, space, time and motion. In his opinion matter in the primitive state before the creation of the world was composed of scattered atoms, which possessed extent. Mixed in various proportions with the articles of void, these atoms produced these elements which are five in number namely earth, air, water, fire and celestial element. Fire is created by striking iron on the stone.

Abu Rehan Beruni, was a versatile genius, who adorned the durbar of Mahmud of Ghazni. His

outstanding achievement in the realm of physics was the accurate determination of the weight of 18 stones. He also discovered that light travels faster than sound. He has also contributed immensely to geological knowledge by providing the correct explanation of the formation of natural spring and artesian wells. He suggested that the Indus valley was formerly an ancient basin filled with alluvial soil. His *Kitab al Jawahir* deals with different types of gems and their specific gravity. A voluminous unedited lapidary by Beruni is kept in manuscript form in the Escorial Library. It deals with a large number of stones and metals from the natural, commercial and medical point of view. Banu Musa has left behind him a work on balance, while Al-Jahiz used hydrostatic balance to determine specific gravity. An excellent treatise had been written by Al-Naziri regarding atmosphere.

Khazini, was a well known scientist of Islam, who explained the greater density of water when nearer to the centre of the earth. Roger Bacon, who proved the same hypotheses afterwards based his proof on the theories advanced by Khazini. His brilliant work *Mizanul Hikma* deals with gravity and contains tables of densities of many solids and liquids. It also contains "observation on capillarity, uses of aerometer to measure densities and appreciate the temperature of liquids, theory of the lever and the application of balance to building." Chapters on weights and measures were written by Ibn Jami and Al-Attar. Abdur Rahman Ibn Nasr wrote an excellent

treatise on weights and measures for the use of Egyptian markets.

Biology

The Muslim scientists made considerable progress in biology especially in botany, and developed horticulture to a high degree of perfection. They paid greater attention to botany in comparison to zoology. Botany reached its zenith in Spain. In zoology the study of the horse was developed almost to the rank of a science. Abu Ubaidah (728—825 A. D.) who wrote more than 100 books, devoted more than fifty books to the study of the horse.

Al-Jahiz, who flourished in Basra is reputed to be one of the greatest zoologists the Muslim world has produced. His influence in the subject may be traced to the Persian 'Al-Qazwini' and the Egyptian 'Al-Damiri'. His book '*Kitab al Haywan*' (book on animals) contains germs of later theories of evolution, adaptation and animal psychology. He was the first to note changes in bird life through migrations. He described the method of obtaining 'ammonia from animal offal by dry distilling.'

Al-Damiri, who died in 1405 in Cairo and who was influenced by Al-Jahiz is the greatest Arab zoologist. His book *Hayat Haywan* (Life of animal) is the most important Muslim work in zoology. It is an encyclopaedia on animal life containing a mine of information on the subject. It contains the history of animals and preceded Buffon by 700 years.

Al-Masudi, has given the rudiments of the theory of evolution in his well known work *Meadows of gold.* Another of his works *Kitab al-Tanbih wal Ishraq* advances his views on evolution namely from mineral to plant, from plant to animal and from animal to man.

In botany Spanish Muslims made the greatest contribution, and some of them are known as the greatest botanists of mediaeval times. They were keen observers and discovered sexual difference between such plants as palms and hemps. They roamed about on sea shores, on mountains and in distant lands in quest of rare botanical herbs. They classified plants into those that grow from seeds, those that grow from cuttings and those that grow of their own accord, i.e., wild growth. The Spanish Muslims advanced in botany far beyond the state in which "it had been left by Dioscorides and augmented the herbology of the Greeks by the addition of 2,000 plants". Regular botanical gardens existed in Cordova, Baghdad, Cairo and Fez for teaching and experimental purposes. Some of these were the finest in the world.

The Cordovan physician, Al-Ghafiqi (D. 1165) was a renowned botanist, who collected plants in Spain and Africa, and described them most accurately. According to G. Sarton he was "the greatest expert of his time on simples. His description of plants was the most precise ever made in Islam; he gave the names of each in Arabic, Latin and Berber".[1]

[1]An Introduction to the History of Science (Vol. II, Part I, page 424).

His outstanding work *Al Adwiyah al Mufradah* dealing with simples was later appropriated by Ibn Baytar."

Abu Zakariya Yahya Ibn Muhammad Ibn Al-Awwan, who flourished at the end of 12 century in Seville (Spain) was the author of the most important Islamic treatise on agriculture during the mediaeval times entitled *Kitab al Filahah.* The book treats more than 585 plants and deals with the cultivation of more than 50 fruit trees. It also discusses numerous diseases of plants and suggests their remedies. The book presents new observations on properties of soil and different types of manures.

Abdullah Ibn Ahmad Ibn al-Baytar, was the greatest botanist and pharmacist of Spain—in fact the greatest of mediaeval times. He roamed about in search of plants and collected herbs on the Mediterranean littoral, from Spain to Syria, described more than 1,400 medical drugs and compared them with the records of more than 150 ancient and Arabian authors. The collection of simple drugs composed by him is the most outstanding botanical work in Arabic. "This book, in fact is the most important for the whole period extending from Dioscorides down to the 16th century."[1] It is an encyclopaedic work on the subject. He later entered into the service of the Ayyubid king, al-Malik al-Kamil, as his chief herbalist in Cairo. From there he travelled through Syria and Asia Minor, and died in Damascus. One of his works *Al-Mughani*

[1]As quoted in *Islamic Background of Modern Science*, page 47 and Introduction to the study of Science by G. Sarton, Vol. II, page 663.

fi al Adwiyah al Mufradah deals with medicine. The other *Al Jami fi al Adwiyah al Mufradah* is a very valuable book containing simple remedies regarding animal, vegetable and mineral matters which has been described above. It deals also with 200 novel plants which were not known upto that time. Abul Abbas Al-Nabati also wandered along the African Coast from Spain to Arabia in search of herbs and plants. He discovered some rare plants on the shore of Red Sea.

Another botanist Ibn Sauri, was accompanied by an artist during his travels in Syria, who made sketches of the plants which they found.

Ibn Wahshiya, wrote his celebrated work *al-Filahah al-Nabatiyah* containing valuable information about animals and plants.

Many Cosmographical encyclopaedias have been written by Arabs and Persians, which contain sections on animals, plants and stones, of which the best known is that of Zakariya al-Kazwini, who died in 1283 A. D. Al-Dinawari wrote an excellent 'book of plants' and al-Bakri has written a book describing in detail the 'Plants of Andalusia'

Ibn Maskwaih, a contemporary of Al-Beruni, advanced a definite theory about evolution. According to him plant life at its lowest stage of evolution does not need any seed for its birth and growth. Nor does it perpetuate its species by means of the seed.

The great advancement of botanical science in Spain led to the development of agriculture and horticulture on a grand scale. "Horticulture improvements" says G. Sarton, "constituted the finest legacies of Islam, and the gardens of Spain proclaim to this day one of the noblest virtues of her Muslim conquerors—The development of agriculture was one of the glories of Muslim Spain."[1]

Transmission to the West

The Muslims were the pioneers of sciences and arts during mediaeval times and formed the necessary link between the ancients and the moderns. Their light of learning dispelled the gloom that had enveloped Europe. Moorish Spain was the main source from which the scientific knowledge of the Muslims and their great achievements were transmitted to France, Germany and England. The Spanish universities of Cordova, Seville and Granada were thronged with Christian and Jewish students who learnt science from the Muslim scientists and who then popularised them in their native lands. Another source for the transmission of Muslim scientific knowledge was Sicily, where during the reign of Muslim kings and even afterwards a large number of scientific works were translated from Arabic into Latin. The most prominent translators who translated Muslims works from Arabic into European languages were Gerard of Cremona, Adelard of Bath, Roger Bacon and Robert Chester. Writing in his celebrated work

[1]An Introduction to the History of Science (Vol. II, Part I)

Moors in Spain Stanley Lane Poole says, "For nearly eight centuries under the Mohammadan rulers, Spain set out to all Europe a shining example of a civilized and enlightened State—Arts, literature and science prospered as they prospered nowhere in Europe. Students flocked from France, Germany and England to drink from the fountain of learning which flowed down in the cities of Moors. The surgeons and doctors of Andalusia were in the van of science; women were encouraged to serious study and the lady doctor was not always unknown among the people of Cordova. Mathematics, astronomy and botany, history, philosophy and jurisprudence, were to be mastered in Spain, and Spain alone. The practical work of the field, the scientific methods of irrigation, the arts of fortification and shipbuilding, of the highest and most elaborate products of the loom, the gravel and the hammer, the potter's wheel and mason's trowel, were brought to perfection by the Spanish Moors. Whatever makes a kingdom great and prosperous, whatever tends to refinement and civilization was found in Muslim Spain."[1]

The students flocked to Spanish cities from all parts of Europe to be infused with the light of learning which lit up Moorish Spain. Another western historian writes, "The light of these universities shone far beyond the Muslim world, and drew students to them from east and west. At Cordova in particular there were a number of Christian students, and the influence of Arab philosophy coming by way of Spain

[1]Moors in Spain.

upon universities of Paris, Oxford and North Italy and upon western Europe thought generally, was very considerable indeed. The book copying industry flourished at Alexandria, Damascus, Cairo and Baghdad and about the year 970, there were 27 free schools open in Cordova for the education of the poor."[1]

Such were the great achievements of Muslims in the field of science which paved the way for the growth of modern sciences.

[1] 'Intellectual Development of Europe'—J. W. Draper, (Vol. II, page 36).

SCIENTIFIC INVENTIONS

Muslims distinguished themselves not only as theoretical scientists and scientific thinkers, but contributed through innumerable inventions to the growth of the modern sciences. Though the mediaeval Muslims had very meagre resources at their command as compared to those of the present age, they achieved a great deal. They replaced the old speculative method of the Greeks with an experimental method, which in later periods formed the basis of all scientific investigations.

Inventions

Abul Hasan is distinguished as the inventor of the Telescope, which he described to be "a Tube, to the extremities of which were attached Diopters".

The Pendulum was invented by Ibn Yunus, a genius in science who lived in the reign of Aziz Billah and Hakim bi-Amr-illah, the Fatimid monarchs of Egypt. The invention of the Pendulum led to the measurement of time by its oscillations. His outstanding work *Sijul Akbar al-Hakimi*, named after his celebrated patron Hakim bi-Amr-illah, was acknowledged to be the masterpiece on the subject replacing the work of Ptolemy. It was translated into Persian by Omar Khayyam in 1079.

The first watch was made by Kutbi, a renowned watch-maker of his time. During the Abbasid reign the use of a watch became quite common and the famous Harun-ar-Rashid once despatched a watch as a gift to his celebrated contemporary, the French Emperor Charlemagne. At that time a watch was considered a novel thing in Europe and was regarded as an object of wonder. Mustansariya, the well-known university of Baghdad had a unique clock with a dial blue like the sky and a sun which continually moved over its surface denoting the time. Maulana Shibli, the famous Urdu litterateur, has described a watch of Damascus in the following words: "The watch was kept in the door of a wall. It contained copper plates and twelve doors. There was an Eagle (*Baz*) standing in the 1st and the last plate. At the end of each hour, these two eagles lay down on the copper plates and hence a sound was produced to show the time. At twelve all the doors were closed. This system was being repeated continuously".[1] The construction of water clocks was also common in Islamic countries. "The Arabs were skilful in the construction of clepsydras and water clocks with automata," says a European writer.

The invention of Mariners Compass, which revolutionised sea borne commerce and oceanic shipping and enabled the Arabs to roam over the stormy seas in quest of new lands and additional markets for their commodities, is essentially a contribution of the Muslims to the world of science.

[1] 'Maqalati Shibli' by Shibli Nomani (Translated from Urdu Text).

Knowledge about the properties of the needle, can no doubt be traced to Chinese sources, but putting it into working shape, in the form of a mariners' compass, was the achievement of Muslim scientists. The compass was probably invented for the purpose of finding out the *Qibla* for Prayers.

Mir Fatehullah Khan is known to history as the inventor of gun and gunpowder. The presumption that gunpowder was first made by the Chinese does not stand the test of historical research. Writing in his book *Arab Civilization*, the author says that "gunpowder was a great invention of the Arabs who were already using guns". Guns were used by Arabs in 1340 A.D. in the defence of Al-Bahsur, when Franz-dol besieged it. The statement of Dr. Leabon about the invention of gunpowder by the Arabs is further corroborated by Mr. Scott in his well-known work, *History of the Moorish Empire in Spain.*

It has been acknowledged by Joseph Hell in his book, *Arab Civilization*, that the distinction of inventing photography goes to Ibn al-Hashem, who is not only credited with its invention but also its development. Muhammad Musa, a great scholar of geography, has the unique distinction of being the inventor of an instrument by which the earth could be measured. He also invented the "Astrolabe". These novel instruments invented by him have been preserved in the Museum of Madrid (Spain).

A unique instrument was invented by Abu Solet Umayya in 1134 A.D. through which a sunken ship

could be raised—which greatly helped in the sálvage expeditions of mediaeval times.

The credit for manufacturing soap goes to Arab chemists, who introduced it to the world. The first paper in Islamic countries was manufactured in 794 A.D. in Baghdad by Yusuf Bin Omar. The paper manufactured in Arab countries was of superior quality than that made in Europe. In the manufacture of cloth, Muslims particularly in Spain exhibited marvellous skill and taste. Their woven cloth captured almost all the big markets of the world and was considered to be the finest as well as extremely durable.

Al-Masudi who died in Cairo in 957 A.D. may be called the "Pliny of the Arabs". In his celebrated work *The Meadows of Gold*, he has described an earthquake, and the first windmill which was also invented by a Muslim.

Giralda or "The Tower of Seville", was the first observatory in Europe. It was built in 1190 A.D., in the Spanish town of Seville under the supervision of the celebrated Mathematician, Jabir Ibn Afiah. It was meant for the observation of heavenly bodies. It was later turned into a belfry by Christian conquerors, who, after the expulsion of the Moors, did not know how to use it.

Bold experiments and unique innovations in the field of mathematics were carried out by Muslim mathematicians who developed this science to an exceptionally high degree. Algebra may be said to have been invented by the Greeks, but according to Oelsner, "it was confined to furnishing amusement for the plays of the goblet". Muslims developed it

and applied it to higher purposes. They invented spherical trigonometry, discovered the tangent and were first, "to introduce the sine of arc in Trigonometrical Calculations". Zero is an invaluable addition made to mathematical science by the Muslims. They have also shown remarkable progress in mathematical geography.

The Muslims have made a lasting contribution to the development of Medical Science. Razi (Rhazes), Ibn Sina (Avicenna), and Abu Ali al-Hasan (Alhazen) were the greatest medical scholars of mediaeval times. Al-Razi was the inventor of "Seton" in Surgery and the author of *Al-Judari wal Hasbah*, an authentic book dealing with measles and small pox. Avicenna wrote *Al-Qanun fil Tib* known as *Cannon*, which was the most widely studied medical work of mediaevel times and was reprinted more than twenty times during the last 30 years of the 15th century in many different languages. Alhazen was the world's greatest authority on "optics". The contagious character of the plague and its remedies were discovered by Ibn Katina, a Moorish Physician.

Ibn Firnas is credited with making glass from stones. He had constructed his home as a sort of planetarium where one could see stars, clouds and even lightning. According to Hitti 'Ibn Firnas was the first man in Arab history to make a scientific attempt at flight. His flying equipment consisted of a suit of feathers with wings, which, we are told carried him a long distance, in the air. When he alighted, however, he hurt himself because his suit was not provided with a tail.

ASTRONOMY

Baghdad, the fairy city of the Arabian Nights and the capital of the famous Harun-ar-Rashid, the greatest emperor of his time, had the distinction of being the foremost centre of art and culture during mediaeval times. Renowned scholars and translators, artists and scientists flocked to this great metropolis from all parts of the world and adorned the learned assemblies of Harun and Mamun, who, besides being celebrated scholars themselves, were the greatest patrons of learning that the world has ever known. The *Darul Hukama* (House of Wisdom) founded by Mamun-ar-Rashid in Baghdad housed some of the most eminent scholars of the world belonging to different castes and creeds. The spade work done by the scholars of the House of Wisdom provided the foundation on which the stately edifice of Islamic learning was built. The caliphate of Mamun, undoubtedly constitutes the most glorious epoch in saracenic history and has rightly been called the 'Augustan age of Islam'. "The twenty years of his reign" says Ameer Ali, " have left enduring monuments of the intellectual development of the Muslim in all directions of thought. Their achievements were not restricted to any particular branch of science or literature, but ranged over the whole course of the domain of intellect; speculative philosophy and 'belles lettres' were cultivated with as much avidity as the exact

sciences".[1] "We see for the first time" says Oelsner, "perhaps in the history of the world, a religious and despotic government allied to philosophy, preparing and partaking in its triumphs".[2]

Astronomy, in the real sense, started among the Arabs during the early period of the Abbasid Caliphate. It was much influenced by *Sidhanta*, a work in Sanskrit brought from India to Baghdad and translated into Arabic by Ibn Ibrahim al-Fazari and later on by Abu Musa Khwarizmi. Pahlavi tables (*zij*) compiled during the Sasanid period and Greek astronomical works translated during this period prepared the ground for Arabian astronomy. Ptolemy's *Almagest* went into several translations in Arabic—the best being the one by Hajjaj Ibn Mater (827-28) and another by Humayun Ibn Ishaq, revised by Thabit bin Qurra (d/901).

Khwarizmi has written a valuable treatise on astronomy and has compiled his own Tables (*zij*) which, after two centuries was revised by Spanish atronomer Majriti (d/1007) and was translated into Latin by Adelard of Bath. This formed the basis of later astronomical pursuits both in the East and the West and replaced all earlier tables of Greek and Indian astronomers. This table was also adopted in China.

Mashallah and Ahmad bin Muhammad al-Nahavandi were the earliest Arab astronomers who flourished during the reign of Mansur, the second Abbasid Caliph. Mashallah was called the Phoenix

[1]A Short History of Saracens, page 274.

[2]As quoted in A Short History of Saracens, page 274.

of his age by Abul Faraj. He is distinguished for writing several valuable treatises on 'Astrolabe' the armillary sphere and the movements of heavenly bodies which have been acclaimed by later scientists. Ahmad compiled from his observations an astronomical table known as *Al-Mustamal* which registered an advance over earlier notions of the Greeks and Hindus.

It was during the reign of Mamun, that practical steps were taken for the advancement of astronomy and several observatories equipped with the latest instruments were set up at various places in his domain. One of them was the observatory in Jundeshapur, in south-west Persia. Early in the 9th century A.D., the first regular observations (*Rasd*) with the best available and fairly accurate instruments were made in this observatory. Mamun got a degree of meridian measured in the plain of Sanjar and followed a method which was much superior to that of Greeks. The astronomical observations made during the reign of Mamun regarding the equinoxes, the eclipses, the apparitions of the comets and other celestial phenomena, have earned an important place in the astronomical annals of mediaeval times. "The size of the earth was calculated", says Ameer Ali "from the measurement of a degree on the shores of the Red Sea—this at a time when Christian Europe was asserting the flatness of the earth".[1] Attached to his *Darul Hukama* (House of Wisdom), Mamun erected at Baghdad near the Shamsiyah gate, an astronomical observatory under the director-

[1]Spirit of Islam, Ch. IX.

ship of Sind Ibn Ali, a converted Jew and Yahya Ibn Abi Mansur (830 or 831 A.D.). According to C. A. Nallino, "Here astronomers made systematic observation of celestial movements and verified with remarkably precise results all the fundamental elements of the *Almagest*: the obliquity of the ecliptic, the precession of the equinoxes, the length of the solar year, etc."[1] With the aid of these observations the astronomical tables called the *Tested Tables* or *Tables of Mamun* were prepared. According to Ibn al-Ibri, Mamun later established another observatory on Mt. Qasiyum outside Damascus. Afterwards several other observatories were erected at Wasit, Apamea, etc. Musa bin Shakir was a well-known engineer during the reign of Harun-ar-Rashid. His sons, specialised in astronomical researches and earned a great reputation as astronomers during the reign of Mamun and his two successors. Their research regarding the movements of solar and other astral bodies, was remarkable. They ascertained the size of the earth, the obliquity of the ecliptic, the variations of the lunar latitudes and the precession of the equinoxes! The work of the sons of Musa bin Shakir was continued by Al-Naziri and Muhammad bin Isa Abu Abdulla, who made notable additions to it. The invention of the telescope by Abul Hasan forms a landmark in the advancement of astronomical observations and, in improved form, was used with remarkable success in the observatories of Maragha, Cairo and Seville. A number of Mamun's astronomers headed by Musa Khwarizmi and Musa Ibn Shakir

[1]History of the Saracens, page 279.

successfully engaged in one of the most oblicate geodetic operations, i.e., the determination of the size and the circumference of the earth. The measurement carried out in the plain of Sanjar and also at Palmyra, "yielded $56\frac{2}{3}$ Arabic miles as the length of a degree of the meridian—a remarkably accurate result, exceeding the real length of the degree at the place by about 2,877 feet" says C. A. Nallino.—"This would make the diameter of the earth 6,500 miles and its circumference 20,400 miles".[1] Muhammad Bin Musa al-Khwarizmi, a versatile genius of Islamic history translated the *Sidhanta* or Indian tables and wrote a commentary on it. He has written a valuable treatise on astronomy and has compiled his own tables (*zij*) which after two centuries were revised by the Spanish astronomer Majriti and translated into Latin by Adelard of Bath in 1126 A.D. These formed the basis of later astronomical works in the East and the West, replacing all earlier tables by Greek and Indian astronomers. These tables were also used in China.

Ibrahim al-Fazari was the first Muslim to construct an astrolabe. He wrote on the use of the armillary sphere and prepared tables in accordance with the Arabic years. One of the earliest Arabic treatises on this instrument was written by Isa-al-Asturlabi who resided in Baghdad at about 830 A. D.

Abul Abbas al-Farghani (Alfraganus), a resident of Farghana in Central Asia, was an astronomer of repute, who in 861 A.D., according to Ibn Abi Usabiyah (Vol. I, page 207), supervised for the Abbasid Caliph Al-Mutawakkil the erection of a Nilometer at Fustat.

[1]As quoted in Hitti, page 375.

His well-known work *Al-Mudkhil-ila-ilm-hayat-al-aflak* (compendium of astronomy) was translated into Latin in 1135 A. D. by John of Seville and Gerard of Cremona. It was also rendered into Hebrew. "The introduction of Astronomy into Christian Europe", says J. W. Draper, "has been attributed to the translation of the works of Muhammad Fargani. In Europe, also, the Arabs were the first to build observatories; the Giralda, or Tower of Seville was erected under the superintendence of Geber, the mathematician".

The Buwayhid Sultans were also great patrons of learning and were surrounded by a galaxy of talented scholars invited from the four corners of the Islamic world. The Buwayhid Sultan Sharaf al-Daulah (982—89, A.D.) founded a good observatory in his palace at Baghdad where such celebrated astronomers as Abdur Rahman al-Sufi, Ahmad al-Saghani and Abul Wafa carried on their research. Abdur Rahman al-Sufi wrote *al-kawakib al-Sabitah* (fixed stars) which is known as a masterpiece of observational astronomy. Alkohi, another astronomer attached to the same dynasty, studied the movements of the planets and his research regarding the summer solstice and the autumnal equinox were of considerable value. Abul Wafa, born in 939 A. D. in Khorasan and established in Iraq was an outstanding mathematician and astronomer, who introduced the use of the secant as well as the tangent into astronomical observations. Another Buwayhid ruler, Rukn al-Daulah, (932—76 A. D.) patronised Abu Jafar al-Khazin, a well-known astronomer of Khorasan, who ascertained 'the

obliquity of the ecliptic and solved a problem of Archimedes which leads to a cubic equation'.[1]

By the close of the tenth century A.D., Baghdad was thronged with hundreds of astronomers including Ali Ibn Amajur and Abul Hasan Ali Ibn Amajur who are known for their accurate calculation of the lunar movements.

Abu Abdulla Ibn Muhammad Ibn Jabir-al Battani (Albategnius—877—918 A.D.) a Sabian from Harran was one of the most illustrious astronomers of the East who is known as the Ptolemy of the Arabs. His tables translated into Latin formed the basis for astronomical work in Europe for several centuries. He also wrote a voluminous treatise on the subject and his astronomical tables were an advance over those of Khwarizmi and the Indians. He carried on his studies and observations in al-Raqqah. He was an outstanding original writer and a research scholar of repute who made several emendations to Ptolemy and rectified the calculations for the orbits of the moon and certain other planets. According to Philip K. Hitti, "He proved the possibility of annular eclipses of the sun and determined with greater accuracy the obliquity of the ecliptic, the length of the tropical year, end of the seasons and the mean orbit of the sun".[2]

Persia, which, after the downfall of the Abbasid Caliphate formed the nerve centre of Islamic learning,

[1]As quoted in Hitti, page 375.
[2]History of the Arabs, page 376.

produced some of the greatest intellectuals of mediaeval times. Great advances were made in almost all branches of knowledge. One of the most outstanding intellectuals of Islam was Abu Rehan Beruni (973—1048 A.D.) who graced the literary meetings of Mahmud Ghaznavi. "Few know physics and metaphysics" says J. N. Sircar, the celebrated Indian historian, "amongst those few the greatest in Asia was Al-Beruni, at once a philosopher and a scientist and pre-eminent in both of these two seemingly incompatible fields".[1] Al-Beruni was a distinguished and original scholar of astronomy and other sciences. His *Al-Qanun al-Masudi* written for his patron Sultan Masud of Ghazni in 1030 A.D. is an astronomical encyclopaedia. A short catechism of geometry, arithmetic, astronomy and astrology also written in 1030 A.D. and entitled *Al-Tahfin li-awail sinaat al-Najum* deals chiefly with the calenders and eras of ancient peoples. The rotation of the earth on its axis and the accurate determination of longitudes and latitudes were also elaborately discussed in this book.

Malik Shah Saljuqi and his illustrious grand vazir Nizamul Mulk Toosi were also great patrons of learning during those times. They established an observatory at Rayy or Neshapur in 1074-75 A.D., where under the guidance of Omar Khayyam and Abdur Rahman al-Hazini astronomical observations were made. Their research led to a reformed calendar which preceded the Gregorian calender by 600 years. According to Sedillot, who is an authority on the subject, "it

[1]Article on Beruni—published in *Hindustan Standard*, Calcutta.

is more exact". This calendar formulated by Omar Khayyam was named *Al-Tarikh Jalali* after his patron Jalaluddin Malik Shah Seljuqi, and is based on an accurate determination of the length of the tropical year. The Gregorian calendar leads to an error of one day in 3,330 years whereas Khayyam's apparently leads to an error of one day in about 5,000 years.

The destruction wrought by the Mongol hordes served a death blow to all cultural and intellectual movements in the world of Islam. The cultural treasures amassed during centuires of intellectual pursuits was reduced to ashes. On the downfall of the Abbasid Caliphate there sprang up small Muslim principalities who kept aloft the candle of learning and vied with each other in the patronage of scholars and scientists. A year after the fall of Baghdad, in 1259 A.D., Hulagu Khan started the construction of the Khaniz observatory in Maragah (Turkistan). This was the best observatory of its time, working under the directorship of the celebrated genius and astronomer of that era, Nasiruddin Toosi, and equipped with the best available instruments including an armillary sphere, the mural quadrant and a solstitial armil. The remains of this observatory are still extant and it was here that Toosi compiled his famous astronomical tables known as *al zij'al il khani* which earned much popularity throughout Asia including China. Nasiruddin Toosi also wrote *Tazkirah fi'ilm al-Hai'a'*, an outstanding work on astronomy.

Samarqand, the capital of the famous conqueror Tamerlane became in those days a great centre of

Islamic education. An astronomical table prepared in 1437 for a prince of the family of Tamerlane and called *Table of Ulugh Beg* was much appreciated in Europe and according to Carra De Vaux was published in England in the 18th century A.D.

The Arab civilization of Spain rivalled that of the Abbasid's in the East, and during the middle of the 10th century astronomical studies were especially favoured by the rulers of Muslim Spain. The outstanding Spanish astronomers were Al-Majriti of Cordova, al-Zarqali (1029—1087 A.D.) of Toledo, Ibn Afiah (d/1140-50 A.D.) of Seville and Nur-ud-din Abu Ishaq al-Bitruji.

In his famous work *Kitab al Hayat* (book of astronomy), which was later translated into Latin by Gerard of Cremona, Jabir Ibn Afiah, the celebrated astronomer of the twelfth century, sharply criticised Ptolemy. Against the observations of Ptolemy he rightly observed that the lower planets, Mercury and Venus, have no visible parallaxes. His generalisations on the subject were confirmed by later research.

Al-Zarqali (Arzachel 1029-1087 A.D.) was the foremost astronomical observer of Muslim Spain. He was the celebrated instrument maker who constructed an improved type of astrolabe (*a safiha*) on which he wrote a treatise. His calculations of the length of the Mediterranean Sea as 42° was approximately accurate in comparison to Ptolemy's estimate of 62° and Al-Khwarizmi's estimate of 52°. He also has the distinction of being the first astronomer to prove

the motion of the solar apogee with reference to stars. His works along with those of Al-Battani were studied and appreciated in the West and Copernicus quotes him in his well known work *De Revolutionibus Orbium Coelestium.*

Nur-ud-Din Abu Ishaq al-Bitruji (Alpetragius), was foremost among the last astronomers of Spain, whose outstanding work *Kitab al-Hai'a* was translated into Latin by Michael Scot in 1217 and into Hebrew in 1259 A.D. He is considered the exponent of a new astronomy and his book marks the culmination of the anti-Ptolemaic movement. According to Draper, "Increased accuracy was given to the correction of the astronomical observations by Alhazen's great discovery of atmospheric refraction."[1]

The first observatory in Europe was built by Arabs in Seville. The famous astronomical tower of Seville was constructed under the supervision of Jabir Ibn Afiah in 1190 A.D. With the fall of the Muslim power in Spain it was turned into a belfry by the Christian conquerors who did not know what else to do with it.

"Finally it was through Spanish channels" says Philip K. Hitti, "that the Latin West found its oriental inspiration in astronomy and astrology. The leading Muslim astronomical works were translated in Spain into Latin, and the *Alfonsine tables* compiled under the aegis of Alfonso X in the 13th century were

[1]Intellectual Development of Europe, Vol. II, page 42.

but a development of Arab astronomy".[1] According to R. Briffault, "Arab astronomy did not forestall Copernicus or Newton, though without it there would have been no Copernicus and Newton".[2]

The Muslims, have thus made the greatest contributions to astronomical knowledge during mediaeval times.

[1]Histrory of the Arabs, page 570.
[2]Making of Humanity, page 190.

MATHEMATICS

Muslims have made immense contributions to almost all branches of the sciences and arts, but mathematics was their favourite subject and its development owes a great deal to the genius of Arab and Persian scholars. The advancement in different branches of mathematical science commenced during the Caliphate of Omayyads, and Hajjaj bin Yusuf, who was himself a translator of Euclid as well as a great patron of mathematicians.

Translations

Whatever mathematical knowledge Arabs inherited came from two sources—the Hindus and the Greeks. The scholars of the *Darul Hukama* of Mamun did the largest amount of work for the advancement of the sciences and arts by the Arabs. Abu Abdulla Muhammad Ibrahim-al-Fazari in 772-773 A.D. translated *Sidhanta* from Sanskrit into Arabic, which, according to G. Sarton provided "possibly the vehicle by means of which the Hindu numerals were transmitted from India to Islam". The works of Greek mathematicians which were translated during the Abbasid Caliphate and served as the starting point for Arab mathematicians were those of Euclid, Ptolemy, Antolyscus, Aristarchos and Archimedes. Hajjaj bin Yusuf was the first to translate Euclid's *Elements* into Arabic while Abdur Rahman

and Muhammad Ibn Muhammad Baqi wrote commentaries on the 10th book of Euclid. The latter's contribution was translated into Latin by Gerard of Cremona and edited by H. Suter in 1907. Ibrahim Ibn-uz-Zaya al-Misri who died in 912 A.D. has written commentaries on Ptolemy's *Centiloquim* and *Proportions*, which influenced modern thought immensely. Abul Abbas Nairizi wrote commentaries on the works of Ptolemy and Euclid, which also were later translated into Latin by Gerard of Cremona. Abul Wafa, the celebrated mathematician, included a simplified version of Ptolemy's *Almagest* in his well-known works—*Tahir al-Majisty* and *Kitab al-Kamil*. The last of the Arab translators and commentators of Greek works was the eminent Arab mathematician Al-Buzjani who died in 998 A.D. He commented upon and simplified the works of Euclid, Ptolemy and Diophantus.

Arabic translations of the well-known mathematical works of those times gave the Arabs the sources to develop the science of mathematics to an admirably high degree and later scientists owe much to the Arab genius. Writing in *The Spirit of Islam*, Ameer Ali says, "Every branch of higher mathematics bears traces of their genius. The Greeks are said to have invented algebra, but among them, as Oelsner has justly remarked, it was confined to furnishing amusement 'for the plays of the goblet'. The Muslims applied it to higher purposes, and thus gave it a value hitherto unknown. Under Mamun they had discovered the equations of the second degree, and very soon after they developed the theory of quadratic

equations and the binomial theorem. Not only algebra, geometry and arithmetic, but optics and mechanics made remarkable progress in the hands of the Muslims. They invented spherical trigonometry; they were the first to apply algebra to geometry, to introduce the tangent, and to substitute the sine for the arc in trigonometrical calculations. Their progress in mathematical geography was no less remarkable".[1] Even the so-called enlightened west which has at times taken pains to minimise the greatness of Muslim achievements in furthering the cause of human civilization, had to admit, though half heartedly, the outstanding part played by the Arabs. "For with this limited ambition", says Carra De Vaux in *Legacy of Islam*, "the Arabs have really achieved great things in science; they taught the use of ciphers, although they did not invent them, and thus became the founders of arithmetic of every day life; they made algebra an exact science and developed it considerably and laid the foundations of analytical geometry; they were indisputably the founders of plane and spherical trigonometry which, properly speaking, did not exist among the Greeks".[2] Thus Muslims were pioneers in the development of mathematical sciences in mediaeval times.

Arithmetic

Arabs were the founders of every day arithmetic and taught the use of ciphers to the world.

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[1]Spirit of Islam, Ch. IX.
[2]Legacy of Islam, page 376.

Musa al-Khwarizmi (780—850 A.D.) a native of Khwarizm, who lived in the reign of Mamun-ar-Rashid, was one of the greatest mathematicians of all times. He composed the oldest Islamic works on arithmetic and algebra which were the principal source of knowledge on the subject for a fairly long time. George Sarton pays glowing tribute to this outstanding Muslim mathematician and considers him "one of the greatest scientists of his race and the greatest of his time".[1] He systematised Greek and Hindu mathematical knowledge and profoundly influenced mathematical thought during mediaeval times. He championed the use of Hindu numerals and has the distinction of being the author of the oldest Arabic work on arithmetic known as *Kitab-ul Jama wat Tafriq*. The original version of this work has disappeared but its Latin translation *Trattati d' Arithmetic* edited by Bon Compagni in 1157 at Rome is still in existence.

Al-Nasavi is the author of *Almugna Fil Hissab Al-Kindi* short extracts of which were published by F. Woepeke in the journal *Asiatique* in 1863. His arithmetic explains the division of fractions and the extraction of square and cubic roots in an almost modern manner. He introduced the decimal system in place of sexagesimal system.

Al-Karkhi was primarily responsible for popularising Hindu numerals before the advent of Arabic ones. His book '*Al-kafi fil Hissab* was translated into German by Hochhevin and published at Halle in 1878—80.

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[1]An Introduction to the History of Science, Vol. I, page 563.

Abu Zakariya Muhammad Al-Hissar who probably lived in the 12th century A. D. is the author of *Kitab-us-saghir-fil-hissab*. One of its important sections was translated and published by H. Suter in 1901. Al-Hissar was the first mathematician who started writing fractions in their present form with a horizontal line. A commentary on his treatise on arithmetic, written by Ibn al-Banna, gained much popularity and was published in French by A. Marre in 1864 and reprinted in Rome in 1865.

Nasir-ud-din Toosi, a versatile genius, who was a prolific writer and has written more than hundreds of valuable books to his credit, has the distinction of being one of the greatest scientists and mathematicians of Islam. Born in 1201 A. D. in Toos (Persia) Nasir-ud-din has written *Al-mutawassat* and a short but concise book on arithmetic which is available both in Arabic and Persian.

Arabic numerals including zero were the greatest contributions made by the Arabs to the mathematical science. The outstanding quality of Arabic numerals lies in the fact that they possess an absolute value. *Huroful Ghubar* was a novel form of numerals adopted in Spain by 950 A. D. The most significant numeral invented by the Arabs was zero which according to Carra De Vaux "was used by the Arabs at least 250 years before it became known in the west". Before the introduction of the zero it was necessary to arrange all figures in columns to differentiate between tens, hundreds, thousands, etc. The earliest use of the zero is given as 873 A. D.

Algebra

Is a word derived from the Arabic source Al-Jabar and is the product of Arabic genius.

Al-Khwarizmi the celebrated mathematician is also the author of *Hisab Al-Jabr Wal Muqabla*, an outstanding work on algebra which contains analytical solutions of linear and quadratic equations. Khwarizmi has the distinction of being one of the founders of algebra who developed this branch of science to an exceptionally high degree. He also gives geometric solutions of quadratic equations, e.g., $x^2+10x=39$ an equation which was repeated by later mathematicians. Robert Chester was the first to translate this book into Latin in 1145 A. D., which introduced Algebra into Europe. Later on this book was translated by Gerard of Cremona also. The Algebra written by Al-Khwarizmi is lucid and well-arranged. After dealing with equations of the second degree, the learned mathematician discussed algebraic multiplications and divisions. Writing in *The Legacy of Islam* Carra De Vaux says, "In the 18th century Leonardo Fibonacci of Pisa, an algebraist of considerable importance says he owed a great deal to the Arabs."[1] He travelled in Egypt, Syria, Greece and Sicily and learned the Arabic methods there, recognised it to be superior to the method of Pythagoras and composed a *liber Abaci* in 15 chapters, the rest of which deals with algebraic calculations. Leonardo enumerates the six cases of the quadratic equations just as Al-Khwa-

[1]Legacy of Islam, page 384.

rizmi gives them. The translation by Robert Chester of Khwarizmi's algebra marks the beginning of the era of the introduction and advancement of this branch of science in Europe. "The importance of Robert's Latin translation of Khwarizmi's algebra", says a modern orientalist, "can hardly be exaggerated because it marked the beginning of European Algebra."

Omar Khayyam, the celebrated poet, philosopher, astronomer and mathematician has left behind an excellent book on algebra. His works on algebra were translated in 1851, while his *Rubaiyat* were first pubished in 1859. The manuscripts of his principal works exist in Paris and in the India Office, London; *Mosadrat*, researches on Euclid's axioms, and *Mushkilat-i-Hissab*, dealing with complicated arithmetical problems, have been preserved in Munich (Germany). According to V. Minorsky, "He was the greatest mathematician of mediaeval times." His primary contribution is in algebra in which he has registered much advance on the work of the Greeks. His algebra is an advance on that of Khwarizmi too in the degree of equations—as the greater part of Omar's book is devoted to the cubic equations only. His algebra deals with the geometric and algebraic solution of equation of the second degree and includes an admirable classification of equations based on the number and different terms which they include. He recognises thirteen different forms of cubic equations. His solution of cubic and quadratic equations by the conic section method is probably the most advanced work of Arabic

mathematics that has survived. "His skill as a geometer" says Carra De Vaux, "is equal to his literary erudition and reveals real logical power and penetration."[1]

Abul Kamil improved upon the algebra of Khwarizmi. He dealt with quadratic equations, multiplication and division of algebraic quantities, addition and subtraction of radicals and the algebraic treatment of pentagons and decagons.

Abu Bakr Karkhi, who adorned the court of Fakhrul Mulk in the beginning of 11th century wrote an outstanding treatise on algebra known as *Al-Fakhri*. This is one of the best books on the subject left by a Muslim mathematician and was published by Woepeke in Paris in 1853 A.D.

Geometry, Like other branches of mathematics, geometry made much headway in the hands of Muslims. The three famous brothers Muhammad, Ahmad and Hassan, sons of Musa bin Shakir, wrote an excellent work on geometry which was translated into Latin by Gerard of Cremona. This was later translated into German by M. Kurtaza.

Abul Wafa Al-Buzjani, (940—997, 998 A. D.) is the author of *Kitab al-Hindusa* which was rendered into Persian by one of his friends. "It had a large number of" says H. Suter, "geometrical problems for the fundamental construction of plane geometry to the constructions of the corners of a regular poly-

[1]Legacy of Islam, page 392.

hedron on the circumscribed sphere of special interest is the fact that a number of these problems are solved by a single span of the compass, a condition which we find for the first time here."[1]

Nasir-ud-din Toosi, a great intellectual giant of Islam wrote *Qawaid-ul-Hindasiya* a book of geometry. Arabs were much in advance of Hindus and Greeks in the development and use of arithmetic, algebra and geometry.

Thabit bin Qurra is universally recognised as the greatest Muslim geometer. He was born in Harran and knew Greek and Syraic languages very well, so that he could read books of these countries in original. He wrote a number of short treatises on astronomy and mathematics. His treatise on *Balance* was translated into Latin by Gerard of Cremona.

Al-Isfahani has contributed to *conics*. Isfahani also translated Greek works on *Conics*.

Trigonometry

It has been universally acknowledged that plane and spherical trigonometry were founded by Muslims who developed it considerably. The Greeks and other advanced nations of the ancient world were ignorant of this essential branch of mathematics.

Khwarizmi, the Muslim mathematician has made valuable contributions to this branch of mathematics also. His trigonometrical tables which deal with the sine and tangent were translated into Latin in 1126 A. D. by Adelard of Bath.

[1]Suter Abh Zur Gesch der Mathem VI, page 39.

Al-Battani (*Latin Albategnius*). The notion of trigonometrical ratios, which is now prevalent, owes its birth to the mathematical talents of Al-Battani. The third chapter, of his astronomical work, dealing with trigonometry, was several times translated into Latin and Spanish languages.

Jabir Bin Afiah is the author of the celebrated book *Kitab Elahia* which deals with astronomy and trigonometry. "His book *Kitab Elahia* says H. Suter, "is noteworthy for preparing the astronomical part with a special chapter on trigonometry. In his spherical trigonometry he takes the rule of the four magnitudes as the foundation for the deviations of his formulae and gives for the first time the fifth main formula of the right angled triangle."[1] His work was translated in Latin by Gerard of Cremona.

Abul Wafa (939—997, 998 A.D.) born at Buzjan in Khorasan later on established in Iraq was one of the greatest mathematicians that Islam has produced. He devoted himself to the researches in mathematics and astronomy. His *Zijush Shamil* (consolidated tables) are distinguished for their accurate observation and he introduced as well as popularised the use of the secant and tangent in trigonometry. "But this was not all," says Sedillot; "struck by the imperfection of the lunar theory of Ptolemy, he verified the ancient observations, and discovered, independently of the *equation of the centre and the eviction*, a third inequality, which is no other than the variation deter-

[1]Encyclopaedia of Islam, Vol. I, page 987, published in 1913.

mined six centuries later by Tycho Brahe."[1] Abul Wafa was also an outstanding geometer who studied the quadrature of parabola and the volume of paraboloid. Writing in the *Legacy of Islam*, Carra de Vaux says, "Abul Wafa's services to trigonometry are indisputable. With him trigonometry becomes all the more explicit."[2] G. Sarton pays glowing tribute to the genius of this Muslim mathematician when he says, "Abul Wafa contributed considerably to the development of trigonometry. He was probably first to show the generality of sine theorem relative to spherical triangles. He gave a new method of constructing sine tables—the value of sine 30 being correct to the 8th decimal place......He made a special study of tangent; calculated a table of tangents; introduced the secant and cosecant; knew those simple relations between the six trigonometric lines, which are now often used to define them."[3]

Abul Hasan Koshiyar (971—1029 A. D.) was a Persian mathematician who wrote his works in Arabic. He played a dominant role in the development of trigonometry. His main subject was the elaboration and explanation of the tangent.

Nasir-ud-din Toosi, a versatile genius, played no mean part in the development of trigonometry.

[1]Quoted in Spirit of Islam, Ch. IX.

[2]Legacy of Islam, page 390.

[3]"It is highly probable", observes Sarton, "That Chinese trigonometry, as used by Kuo Shouching in the second half of the 13th century and the beginning of the 14th was also of Arab origin. The transmission of Arabic trigonometry to the Far East would have been particularly easy at that time because the Muslim East and China were the integral parts of the same Mongol Empire" (Introduction to the Histroy of Science Vol. I, page 667.)

His works on trigonometry mark the culmination of the advancement on the subject. He is the author of the *Kitab shakl al-Qita* in which trigonometry has been treated independently of astronomy. The book is very comprehensive and rather the best work on the subject written in mediaeval times. It was translated into French and edited by Alexandre Cara Theodory Pasha in 1891. Carra de Vaux says "Trigonometry, plane or spherical, is now well established and finds in this book its first methodically developed and deliberate expression."[1] Nasir-ud-din's book remained to be the greatest work of its kind until *De triangulurs* of Regiomontenus two centuries later.

Such were the great mathematical giants which the Muslim world produced, who were not only the pioneers of mathematical science during mediaeval times, but are considered to be authorities on several mathematical problems even during the modern age. The development of mathematics owes a great deal to the genius of these Muslim luminaries.

[1]Legacy of Islam, page 397.

MEDICAL SCIENCE

It has been established by modern historical research that the earliest human civilization dates back to about 7,000 years. Egypt and Babylon were the first countries to feel the impact of civilization, which was disseminated through various other countries including Assyria, China, India, Persia and Phoenicia, ultimately reaching Greece where it found the most congenial atmosphere for its adequate development. Romans inherited their knowledge from such eminent Greek intellectuals as Socrates and Plato, Aristotle and Pericles, Demosthenes and Sophocles. The downfall of the Roman Empire caused intellectual stagnation and the storm of barbarism which swept over the world presented the greatest threat to cultural progress, which would have been in danger of total extinction, had it not been saved by the timely intervention of the Arabs. "The Arabs" says Humboldt, "were admirably situated to act the part of mediators, and to influence the nations from the Eupharates to the Guadalquivir and Mid-Africa. Their unexampled intellectual activity marks a distinct epoch in the history of the world."[1]

The golden era of Muslims' achievement in the field of scientific and philosophical research, began

[1]Spirit of Islam, Ch., IX.

in 900 A. D. and lasted for two centuries. The physicians and scientists of the Islamic world having stood on the firm foundation of Greek science began to rely upon their own resources and to develop from within.

Jabir known as the father of Arabic alchemy was a mystic and was known as 'Geber' in mediaeval Latin literature. He was closely attached to the family of the Barmekides, the ministerial dynasty of the Abbasid Caliphate. He had founded a laboratory at Kufa, whose ruins were discovered 200 years later. Sir Thomas Arnold pays eloquent tribute to this great Muslim scientist when he says, "At the very dawn stands the figure of a Muslim whose shadow lies athwart the science of the middle ages in the orient as in the Occident."

Al-Razi:(Latin Rhazes 865—925 A.D.) was born at Rayy (Persia) in 865 A. D. "Rhazes" says Max Meyerhof, "was undoubtedly the greatest physician of the Islamic world and one of the great physicians of all time."[1] In his young age he practised as an alchemist but later he devoted himself exclusively to the development of medical science both in theory and practice. He wrote *Kitab Al-Mansuri* (called *Liber Almansoris* in Latin) a 10 volume treatise dealing with Greek medicine which was published in several editions. According to an European writer, "His erudition was all embracing and his scientific output remarkable, amounting to more than 200 books,

[1]Legacy of Islam, page 323.

half of which are medical.[1] His outstanding work, *Al-Judari-wal-Hasbah* a book dealing with small-pox and measles is one of the most authentic books on the subject even to the present day. It was translated into Latin and other European languages and was published more than forty times between 1498 and 1866 A.D. It contains detailed information regarding the treatment of postules. The greatest achievement of Al-Razi in the realm of medical science is his celebrated work *Al-Hawi* (Latin *Continens*) the most comprehensive encyclopaedia of medicine ever written by a medical man, which runs into 20 volumes. This book was translated into Latin by the Sicilian Jewish physician, Faraj Ibn Salim, on the order of Charles I, King of Sicily, and named *Continens.* "Its influence on European medicine was thus very considerable," says Max Meyerhof.[2] Al-Razi has also contributed to gynecology, obstetrics, ophthalmology and has written valuable treatise on the treatment of some common diseases in the East including stones in the bladder and kidneys. He was also an eminent surgeon and is the inventor of 'Seton' in surgery. He settled in Baghdad where he founded a hospital named *Bimaristan.* He selected its site by hanging pieces of raw meat in various localities and choosing the spot where they showed least signs of putrefaction.

Ali Ibn Al-Abbas-al-Majusi known in the west as Haly Abbas, who died in 994 A. D., was the author of a celebrated work *Kitab-al-Maliki* known as *Liber Regius* in Latin, an excellent and compact

[1]Legacy of Islam, page 323.
[2]Legacy of Islam, page 325.

encyclopaedia dealing with both the theory and practice of medical science. It is less voluminous than Al-Razi's *Hawi* and it remained a standard book until it was superseded by the *Canon* the masterpiece of the great Avicenna. Perhaps Majusi was the first physician to write about the capillary system and to describe accurately the way in which a child is born.

Abu Ali Al-Husain-al-Sina, (980—1037 A.D.) known as Avicenna in the west was one of the greatest intellectuals of the Islamic world who is ranked second only to Aristotle, the greatest mind the world has ever produced. His intellectual achievement as a physician is less remarkable than his achievements as a philosopher and physicist. He had visited the court of Noah the II, the Samanid Ruler of Bokhara who allowed him to use his well equipped library. His gigantic work *Al-Qanun-Fil-Tib* known as *Canon* in Latin is the culmination and masterpiece of Arab systematisation. It is a medical encyclopaedia dealing with 760 drugs, as well as with general medicine, simple drugs, and diseases affecting all parts of the body. It is particularly concerned with Pathology and Pharmacopoeia and was translated into Latin in the 12th century by Gerard of Cremona. The popularity of this excellent book may be gauged by the fact that during the last 30 years of the 15th century it was printed 16 times and in the 16th century 20 times in various European languages. Publications including sections from this work as well as commentaries on it in various languages of both the East and West are innumerable. According to a celebrated western writer, "Probably no



AVICENNA GIVING A LECTURE ON ANATOMY.

TWO ILLUSTRATIONS FROM A MODERN ARABIC ALCHEMICAL MSS.





Symbolic figures of mixtures.

medical work ever written has been so much studied ......Hence his influence on European medicine has been overwhelming."[1] Sir Jadu Nath Sircar, the celebrated Indian Historian pays eloquent tribute to Ibn Sina when he says, "Avicenna was the greatest intellectual giant of the middle ages."[2] He discovered the spreading of disease through water. Avicenna was responsible for elevating Islamic medicine to its zenith, and his portrait as well as that of Al-Razi still adorns the grand Hall of the Faculty of Medicine in the University of Paris.

Abu-Al-Jarrah-Al-Zahrawi known in Latin as Abul Casis who died in 1013 was a great surgeon who wrote *Al-Tasrif* containing 30 sections, the last of which deals with surgery. Muslim physicians at that time did not pay any attention to surgery and it was a totally neglected field. *Al-Tasrif* is fully illustrated with sketches of surgical instruments and it profoundly contributed to the development of surgery both in the East and the West. It was translated into several European languages and the famous French surgeon Guy de Chauliac benefitted from one of its Latin translations. Stanley Lane Poole in his celebrated work *The Moors in Spain* pays eloquent tribute to the part played by Spanish Muslims in the awakening of the West, when he says, "Every branch of science was seriously studied there, and medicine received more and greater additions by the discoveries of the doctors and surgeons of Andalusia

[1]Legacy of Islam, page *329-30.*

[2]An Article on Beruni published in *Hindustan Standard*, Calcutta.

than it had gained during all the centuries that had elapsed since the days of Galen."[1]

Ali Ibn Isa of Baghdad known in Latin as Jesu Occulist has written an excellent treatise on ophthalmology, a branch of medicine dealing with eye diseases. It was translated into Latin and was considered the authoritative work on eye diseases in Europe till the middle of the 18th century.[1]

Abu Ali al-Hasan (965—1020 A.D.) known as Alhazen in the west is recognised as the greatest authority on optics the world has ever produced. He was born at Basra and later joined the service of a Fatimid Caliph of Egypt, where he was assigned to discover the method of regulating the inundation of the river Nile. He could not achieve this objective, hence he had to remain underground till the death of the Caliph. He has made valuable contributions to the development of physics and medicine, but his outstanding achievement is in the realm of optics. He has corrected the theories of Euclid and Ptolemy on the subject. His *Opticae Thesaurus* influenced such great writers on optics as Roger Bacon, Leonard da Vinci, John Kepler and all mediaeval western writers, who base their works on the research of Alhazen. The two greatest luminaries of the Islamic world Ibn Sina and Al-Beruni shared and fully endorsed Alhazen's opinion that, 'It is not the ray that leaves the eye and meets the object that gives rise to vision. Rather the form of the perceived object passes into the eye and is transmitted by its transparent body.'

[1]Moors in Spain, page 144.

Ibn Rushd known as Averroes in the west who died in 1198 in Morocco is the greatest Aristotelian philosopher. He is the author of 16 medical works of which one *Kulliyat Fil Tib* dealing with general rules of medicine was translated into Latin as *Colliget.* It was printed several times in Europe. Averroes is one of the most outstanding literary figures that Islamic Spain has produced and he was instrumental in clearing away the darkness of illiteracy that had enveloped Europe.

Ibn Katina, the Moorish physician who died in 1369 A.D. is the author of excellent book on the plague. A severe plague which ravaged Alemaria in Spain in 1348-49 A.D. caused the celebrated physician to write a treatise on the plague which was superior to all earlier works on the subject. This book was edited and translated in Europe in the 15th century A.D. and revealed the contagious character of the plague and its remedies which were not known to Greek physicians.

The study of medicine in Europe began at Salerno (Sicily) where Constantine the African, a disciple of an Arab Physician organised the first medical school. The medical school of Montpellier soon followed suit, which was founded on the pattern of Cordova under the guidance of Jewish doctors. Other schools on the same lines were opened at Pisa and later at Padua (Italy) where *Canon* of Avicenna and the *Surgery* of Abul Qasim remained until the 17th century the text books of medical science throughout Europe. Robert Briffault writes, "The Pharmacopoeia created by the Arabs is virtually that which but for the

recent Synthetic and organotherapic—Apic preparations, is in use at the present day; our common drugs, such as nux vomica, Senna, Rhubarb, aconite, gention, myrrh, calomel and structure of our prescriptions, belong to the Arabic medicine."[1]

[1]Making of Humanity, page 195.

HOSPITALS IN MEDIAEVAL ISLAM

The Muslims, even in the days of early Islam had developed a high culture and had organised their administration on a sound footing. The Islamic Caliphates as well as other Muslim principalities had created separate departments for different subjects which were headed by Ministers and supervised by Secretaries. Organised on highly efficient lines was the public works department whose function was the construction and maintenance of roads and bridges as well as the provision of sanitation and medical facilities to all classes of people. Never before had medical facilities been provided for the common people on such a large scale and in such an organised form. The Muslims were the first to establish hospitals, dispensaries and medical schools in the world. "In the curative use of drugs," writes Philip K. Hitti, "some remarkable advances were made at this time by the Arabs. It was they who established the first apothecary shop, founded the earliest school of pharmacy and produced the first pharmacopoeia."[1] Several pharmacological books were written by Arabs. The author of the first of these books was the celebrated Jabir bin Hayyan. The greatest medical theorists during mediaeval times were Zakariya Razi (Rhazes), Ibn Sina (Avicenna), Tabari and Majusi. Among these Razi and Ibn Sina were also two of the outstanding practising physicians of their time.

[1] History of the Arabs, page 364.

Early period

Even before the advent of Islam, Haris Ibn Kalda, a resident of Taif who had mastered medical science was welcomed in the court of the Persian emperor, Nausherwan, the Just. His son, Nasir Ibn Haris, earned an even greater reputation than his father as a physician and was instrumental in popularising medical science in early Islamic Arabia. Hazrat Omar, the second Caliph of Islam despatched a company of physicians along with the Arab army bound for Persia.

The Omayyad Caliphate represents a period of consolidation and proper organisation of Muslim resources. The third Omayyad Caliph, Walid Ibn Abdul Malik, who took much interest in public works, founded an institute for blind and disabled persons. He established the first medical dispensary in Islam in 88 A. H. and staffed it with a number of able physicians and surgeons. Soon afterwards dozens of small dispensaries sprang up all over the vast Omayyad empire.

Abbasids

The Abbasid Caliphate provided the most congenial atmosphere for the development of culture and the advancement of public welfare activities. The early hospitals in the Islamic domains were founded on the models of the old academy—hospital of Jundeshapur and were named *Bimaristan.* The first hospital was founded at the beginning of the 9th century in Baghdad during the reign of the celebrated Abbasid

Caliph Harun-ar-Rashid. Five more hospitals were established during the 10th century A.D. Greek and Persian methods of medical treatment were prevalent during the early period of the Abbasid Caliphate, but the talented Barmekides also introduced Indian methods. They invited a number of Indian *vaids*, had their medical works translated into Arabic and founded a big dispensary in Baghdad in which patients were treated by Indian methods. Harun-ar-Rashid also created a separate department of health, which used to run several Government dispensaries staffed by talented physicians. The department was supervised by an Inspector-General of Health and Bukht Yishu was the first to be appointed to this high post in 171 A.H. The same post was occupied by his son Jabriel in 175 A.H. The medical practitioners were highly paid and Jabriel received ten thousand dirhams as his monthly salary and five thousand as allowances from the imperial exchequer. In addition he earned lacs through his private practice, mostly from high dignitaries of the State. His house and his person rivalled in luxury to that of the Caliph. According to the author of the *Chahar Minar* the biggest income of all the physicians was that of Bukht Yishu bin Jurjis. His salary from Harun-ar-Rashid was 10,000 dirhams a month. The value of presents received by him was estimated to be over 3,00,000 dirhams a year. From the house of the Caliph he received a retaining fee of 4,00,000 dirhams. He was also physician to the Barmekides who paid him 25,00,000 dirhams a year for his services. In addition to all this he received from his private practice about 5,00,000 dirhams a year. This amounts to a total income

of not less than 40,00,000 dirhams a year which represents about £1,75,000 per annum.

The maintenance of efficiency and high standards in the medical profession was also looked after. As early as the days of Mamun and Mutasim, pharmacists had to pass a sort of proficiency test, before starting their practice.

In the reign of another Abbasid Caliph, al-Muqtadir Billah, the Medical Department registered phenomenal progress. His talented minister Ali Ibn Isa took a lively interest in public welfare activities. Sinan Ibn Thabit Ibn Qurra an eminent physician was the Inspector-General of Health. The outbreak of large scale epidemics in the Abbasid domains necessitated the expansion of the Health Department. A number of new hospitals were opened and a separate hospital was attached to each jail. A section of temporary dispensaries was also opened. Hundreds of physicians were appointed who toured the rural areas with mobile dispensaries and attended to ailing persons. In addition to these arrangements, Muqtadir Billah also founded several large hospitals, one of which was built on the bank of the river Tigris and spent about Rs. 35,000 a year. Another hospital built in his own name, had an annual expenditure of about Rs. 12,000. Due to the discovery of a case of malpractice, Sinan, who was the Inspector-General of Health, was ordered by the Caliph in 931 A.D. to test all practising physicians and grant certificates to those who could satisfy him. Diplomas were awarded to successful candidates. Arrangements were made for

practical instruction. Orthopaedists were examined as to whether they were acquainted with anatomy and surgery. Like surgeons, the ophthalmologists had to undergo a further test and were forbidden to practise unless they knew the gross anatomy of the eye-ball. They had to satisfy the examiner that they knew the three principal diseases of the eye as well as their complications. Hence a system of medical proficiency tests was introduced and over 860 men passed the test in Baghdad alone and started their practice. In this way the Metropolis of Abbasids rid itself of its quaks.

Medical facilities were provided in the distant part of the far flung Abbasid domains. At least 34 hospitals were scattered all over the Islamic world during the Abbasid Caliphate and mobile clinics existed in the 11th century. The hospitals trained physicians as well as treating patients. They were divided into male and female sections and also contained medical libraries which offered courses in medicine.

Egypt

Egypt was somewhat backward in establishing centres of medical facilities. According to Allama Maqrizi, a dispensary was opened in Cairo under the orders of Fath Ibn Khaqan, the Minister of Caliph Al-Mutawakkil Billah. The first hospital in Cairo was built by Ibn Tulun, the Governor of Cairo in 872 A.D., and it survived until the 15th century. The celebrated Governor had set aside property yielding Rs. 3 lakhs a year to meet the necessary expenditures of the

hospital. He had made elaborate arrangements for the free boarding, lodging and dress of the patients. The hospital was equipped with all available medical facilities and had obtained the services of the best physicians who regularly examined the patients twice a day. A separate section of the building was reserved for the treatment of lunatics. The Governor himself visited the hospital on every Friday. Each of the two main sections of the hospital was divided into several halls. The biggest hall, meant for general medical cases, was partitioned into small rooms each serving a different disease. There were separate wards for surgical cases, eye diseases and orthopaedic cases. From the point of view of treatment the hospital was divided into two main sections—the out-patient department and the in-patient department.

Ayyubids and other dynasties

At a time when the dwindling Abbasid Caliphate was helpless to meet the greatest threat to Islam, Sultan Nuruddin Zangi and Sultan Salahuddin Ayyubi successfully met the challenge and rolled back the surging waves of crusaders who had swarmed into the Holy land. These incessant military campaigns could not lessen their interest in the patronage of art and learning and they spent the major part of their income on public welfare activities. Allama Ibn Jubayr, who, on his way to Mecca in the 6th century A.H. passed through Baghdad, Mosul, Aleppo and Damascus found a network of charitable public welfare institutions there. Nuruddin had opened a big dispensary in Damascus which was called *Nooriya* which met the expenses of indoor and out-

door patients. Another institution of the same type existed in Damascus.

In 577 A.H., Sultan Salahuddin Ayyubi, better known in the west as Saladin, converted a large Fatimid Palace into a hospital. Allama Ibn Jubayr visited this grand hospital in Cairo and gives a detailed description in his Travelogue. It contained hundreds of beds for indoor patients and had a separate ward for female patients who were attended to by female staff only. A separate portion of the hospital, with spacious grounds bounded by high walls was reserved for the lunatics. This hospital was frequently inspected by the Sultan himself who kept a strict watch over it. The Sultan had also built another magnificent hospital in Alexandria.

The lead given by Sultans Nuruddin Zangi and Salahuddin Ayyubi was enthusiastically followed by others and well-to-do people vied with each other in founding public welfare institutions. In 678 A.H., when Mansur Qalaun ascended the throne of Cairo, he built a magnificent hospital in Cairo, which was second only to the Azdiya Hospital in Baghdad. The hospital was housed in four big buildings, occupying an area of 10,600 square yards. A canal which flowed through the hospital supplied it with water. The ruler had set aside property yielding a million dirhams per annum for its expenses. This hospital which was open to all had separate apartments for the treatment of patients suffering from different diseases. A teaching institution was also attached to this hospital.

The biggest hospital of the world of Islam which was equipped with all available medical facilities was built by Azud-al-Daulah in 368 A.H. in Baghdad. This hospital, which, with its spacious buildings, up-to-date medical instruments, excellent arrangements and efficient administration could rank with the best hospitals built until the middle of the 19th century was in reality a Medical University. Drawn from all parts of the Islamic world were the more than eighty medical specialists including Ibn Baksh, Abu Yaqoob and Abu Isa who treated patients and also delivered lectures on various medical subjects.

The hospital, which took three years to be built, employed skilful ophthalmologists like Abu Nasr Ibn-ul-Duhali, surgeons like Abul Khair and orthopaedic surgeons like Abul Salh. According to Al-Qifti, Ibn Manduyah of Isfahan was summoned from Central Asia. "All these (hospitals) were overshadowed" says a European writer, "by the hospital that he founded in Baghdad, complete with equipment, numerous trust funds and a pharmacy stocked in drugs brought from the ends of the earth".[1] A list of diets and drugs used in this hospital is preserved in the British Museum in London. The main dispensary of the hospital was housed in a palatial building. Benjamin of Tudela, a Jew who visited Baghdad in 1160 A.D., found no less than sixty medical institutions there. He writes:—"All are well provided from the king's stores with spices and other necessaries. Every patient who claims assistance is fed at the king's expense until his cure is complete. There is another

[1]Medical History of Persia and Eastern Caliphate by C. Elgood, pages 159.

large building called the *Darul Maraphtan* in which are locked up all those insane persons who are met with during the hot season, everyone of whom is secured by iron chain until his reason returns, when he is allowed to return home. For this purpose they are regularly examined once a month by the king's officers appointed for the purpose, and, when they are found to be possessed of reason, they are immediately liberated. All this is done by the king in pure charity towards all those who come to Baghdad, either ill or insane, for the king is a pious man and his intention is excellent in this respect".[1]

A number of medical institutions and hospitals were opened in Baghdad and in the provinces during the 11th and 12th centuries A.D. In 1113 A.D., a hospital was opened in Baghdad by Khumastigin and was known as Tutushi hospital. A few years later a school for orphans was built by Mustufi Aziz-ud-Din who bore all the expenses of its residents. A hospital attached to a medical university was founded by Azud-al Daulah in Shiraz. Abu Said Kukuburi, built four asylums in Arbela for the blind and for persons suffering from chronic diseases.

The big hospitals like that of Azud-al Daulah employed a large staff both technical and administrative. The Chief Officer of the dispensary was called *Shaikh Saydalani.* The administration of the hospital was headed by a governor who used to be a non-technical man usually a general or prince. The post of *mutwalli* or *dean* was usually filled by a medical

[1]As quoted by C. Elgood page 172.

man. It was occupied by Al-Razi (Rhazes) at Rayy and later he was appointed *mutawalli* of the old hospital in Baghdad. Al-Jurjani held this post at Khwarizm.

One of the finest Islamic hospitals was built by Abdul Wahid al-Marakeshi in Morocco in about 1200 A. D. According to the writer of the *Medical History of Persia*, "The hospital was unequalled in the world. First there was selected a large open space in the most level part of the town. The workmen embellished with a beauty of sculpture and ornamentation even beyond what was demanded of them. All sorts of suitable trees and fruit trees were planted there. Water there was in abundance, flowing through all the rooms. In addition there were four large pools in the centre of the building, one of them was lined with white marble. The hospital was furnished with valuable carpets of wool, cotton, silk and leather, so wonderful that I cannot even describe them. For the use of patients there were provided day-dresses and night dresses, thick for winter, thin for summer. After he was cured, a poor patient received on leaving the hospital a sum of money sufficient to keep him for a time. Rich patients received back their money and clothes......Every Friday the Prince after the midday prayer mounted his horse to go and visit the patients and learn about each of them".[1]

A number of hospitals and dispensaries were established in Mecca and Medina. In 628 A.H., the Abbasid Caliph, Al-Mustansir Billah built a large dispensary in Mecca. Muslim India did not lag behind

[1]A Medical History of Persia and Eastern Caliphate, by C. Elgood, pages 176-77

other countries in this humanitarian work and according to Allama Maqrizi, in the reign of Muhammad Tughlaq, Delhi alone possessed more than 70 dispensaries. The Moghal Emperor Jehangir had issued a proclamation for the establishment of a greater number of hospitals and dispensaries in his dominions. A Muslim physician in Cadiz (Spain) had planted in the park of the governor a botanical garden in which he cultivated rare medical herbs which he had brought from his travels.

Special Features

A military medical unit existed from the days of early Islam, and during the reign of the second Caliph such a unit was attached to each army. Sultan Mahmud, the Saljuq was first to organise military hospitals and mobile dispensaries on a regular basis. The military medical equipment of the Saljuq kings moved on hundred camels.

A post of Inspector-General of Hospitals was created during the Abbasid regime, which was usually occupied by the most outstanding physician of the Islamic world. Another post, that of Chief Chemist was also created, to head the Department which supervised the preparation of drugs. Zia Ibn Baytar, who was a great botanist and herbalist occupied this post in 646 A.H.

HISTORIOGRAPHY

The desire to preserve the records of human achievement is a very primitive one and dates back to the earliest known civilization. Such records were laid down on stupas, stone slabs, wood and leather pieces, and are still preserved in the great museums of the world. The oldest book, written in Egypt, also relates to history, but the profound development of historiography and its elevation to the status of a science owes much to the genius of Muslim historians. Writing in the *History of Muslim Historiography* Franz Rosenthal admits that 'Muslim historiography has at all times been united by the closest ties with the general development of scholarship in Islam, and the position of historical knowledge in Muslim education has exercised a decisive influence upon the intellectual level of historical writing....The Muslims achieved a definite advance beyond previous historical writing in the sociological understanding of history and the systematisation of historiography. The development of modern historical writing seems to have gained considerably in speed and substance through the utilization of a Muslim Literature which enabled western historians, from the seventeenth century on, to see a large section of the world through foreign eyes. The Muslim historiography helped indirectly and modestly to shape present day historical thinking."[1]

[1]History of Muslim Historiography, by F. Rosenthal, pages 176-77.

The sciences and arts which have been cultivated under diverse civilizations may be traced to even earlier periods for their initial growth. Arguments and reasoning were used since time immemorial, but it was Aristotle who systematized the art of reasoning and gave it the name of logic. So it was with historiography. People always took pride in relating the achievements and exploits of their ancestors, but the Arabs, always had a particular attachment for their forebearers. The lineage of each clan was sacredly guarded against being forgotten by their progeny. Even the lineage of horses and camels were preserved by the Arabs.

The advent of Islam paved the way for the growth of historiography in Arabia. The abundance of historical data in the Holy Quran provided the followers of Islam with an incentive to study history. The learned discourses of the Holy Prophet of Islam were always punctuated with historical references to the past, which awakened an interest hitherto unknown, for historiography, among the adherents of the new faith. In the initial stages, historical events were mostly committed to memory which led to differences in the reports of the same speeches and events. The well known oration of Hajjaj bin Yusuf, on his first entry into Kufa has been differently reported by various historians. But later on, with the appearance of celebrated historians like Waqidi, Balazuri, Dinawari and Tabari large volumes of history were compiled. The works of some of these great historical minds have been translated into European languages. "The main task of mankind was accomplished by

Muslims," says George Sarton. "The greatest philosopher, Al-Farabi was a Muslim; the greatest mathematicians Abul Kamil and Ibrahim Ibn Sinan were Muslims: the greatest geographer and encyclopaedist Al-Masudi was a Muslim; the greatest historian, Al-Tabari was still a Muslim."[1]

History has always been considered as the most important subject in the educational curriculum of Muslims. A thorough knowledge of history was essential for princes, ministers and scholars alike. No education was considered to be complete without a detailed background of history. Even the soldiers were taught the history of the rise and fall of different nations especially that of the Muslim powers.

Early Historians

The anxiety to know the minutest details about the life of the Holy Prophet and his gifted associates led to great efforts on the part of Muslims to acquire an authentic version of the facts and to preserve them for posterity. The traditions of the Holy Prophet collected by some of the celebrated historians of Islam formed the greatest biographical history that had ever been compiled. Arab traditionalists and historians devised many means of ascertaining the authenticity of the facts. The reports were obtained and compiled through a chain of reporters and transmitters whose trustworthiness and origin were fully investigated. This necessitated a knowledge of the history of the transmitters which ultimately led to the

[1]An Introduction to the History of Science, Vol. I, page 624.

development of geography and biography among the Arabs. In the beginning the source of information was confined to oral reports only. One device adopted by the early historians of Islam in recording the facts was dating them by year, month and even by day. According to the historian Buckla, 'this practice was not adopted in Europe before 1597 A. D.' Another method, that of historical research and criticism originated by the celebrated historian Ibn Khaldun and practised by the later historians both in the East and the West could not be surpassed even during modern times.

History provides one of the most copious sections of Arabic literature. A western orientalist Wus-Tenfeld collected more than 590 historical works written in Arabic during the first thousand years of the Islamic era. The writing of history commenced during the Omayyad period and was developed during the Abbasid Rule. The author of *Kashfuz Zunun* gives a list of 1,300 history books written in Arabic during the first few centuries of Islam. Only a few historical works of the Omayyad period have survived. The early historians depended on the continuity of the chain of reports, more particularly on the authenticity and the integrity of the reporters while recording the facts and did not exercise much power of analysis, criticism, comparison or inference. The early historical compositions were mostly based on legends, traditions, biographies, genealogies and narratives obtained through a chain of intermediate oral reporters each of whom passed on the original report to his successor.

The composition of the real books of Islamic history started in the second century A. H. "In historical research" says Ameer Ali, "The Muslims have not been behind any other nation, ancient or modern....Archaeology, geography and ethnology were included in history....Between the simple work of Ibn Ishaq to the universal history of Ibn Khaldun there is a great difference, but the intervening space is occupied by a host of writers."[1]

Awanah bin al-Hakam, was among the transmitters of knowledge, who lived before the advent of books. He was a man of humble origin, his father being a slave tailor. He died either in 147 or 158 A. H. He was a great source of information for early Arab historians and is considered an authority on the Arab conquests.

Among early Arab historians, Ali bin Muhammad bin Abdulla Madaini occupies an outstanding place. He was a copious writer who was born in 135 A. H. and died in 225 A. H. He toured Basrah, Madain and later settled in Baghdad where he was patronised by the celebrated musician Ishaq al-Mausili. He had divided his works into groups of books—the first dealing with the records of the Prophet, the second with records of Quraish, the third with the marriage of nobles and the records of women, the fourth with records of the Caliphs from Hazrat Abu Bakr to Mutasim, the fifth with historical events in Islam, the sixth with Islamic conquest, the seventh with the records of the Arabs and the eighth with

[1]Spirit of Islam, Ch. IX.

poetical history. Madaini is cited as an authority by later historians. Yaqut in his historical dictionary of authors, gives a list of *kutub muallafah*, said to be written by Madaini. Abu Mikhnaf and Madaini are according to Brunnow well informed and impartial. The writing of Madaini influenced a number of writers including the Spanish Ibn Abd Rabbihi, whose collection of the speeches of Hazrat Ali has been preserved. His collection of the correspondence of Hazrat Ali, Muawiyah and others is considered to be very reliable.

Hisham bin Muhammad bin al-Sayyib al-Kalbi of Kufa was another historian who was much influenced by Madaini and adopted his method of approach as well as his subject matter. His list of works exceeded 150 and he is considered an authority on genealogies. One of his works *Kitab-al-Asham* has been printed. His books dealt with details on varied subjects relating to Arab life such as archaeology, religion, judges, *kahins* and *jinns*. Of his 129 works listed by *al-Fihrist* of Nadim, only three have survived. His other works were extensively quoted by later historians including Tabari and Yaqut. The oldest extant Arabic history is the biography of the Prophet written by Ibn Ishaq at the behest of the Abbasid Caliph Mansur. Ibn Ishaq died in 151 A. H.

Muhammad bin Omar al-Waqidi (130—207 A. H.) was the most outstanding historian of the second century of the Islamic era. He was a more serious writer than Madaini or Kalbi and was a pupil of Hazrat Sufian Sauri. He is considered an authority

on tradition, Islamic jurisprudence and history. He possessed a big library which was loaded on 120 camels when it was moved from one part of Baghdad to the other. He was a prolific writer on varied subjects. His special attention to chronology has been commended by western writers. He wrote *Maghazi* which dealt with the conquests of Uqabah in West Africa. His secretary, Ibn Said wrote the first classified biography dealing with the life of the Holy Prophet of Islam and his companions.

As the record of events were mostly based on the verbal reports of eye-witnesses or persons connected with them, writers had to undertake extensive tours of distant lands, which led to the growth of travel, geographical and other literature connected with the various regions. History has always been popular among Muslims and during the second century, people became particularly interested in this subject.

Third Century

The third century of the Islamic era was a period of great intellectual attainments in the history of the Arabs. It was in this period that some of the brightest luminaries appeared on the horizon of Arab learning, whose light guided later writers in different branches of knowledge.

One of the earliest historians of the third century was Ahmad bin Yahya Balazuri, who died in 279 A. H. Like Tabari, he travelled extensively in quest of historical knowledge. His two extant historical

works are *Futuh-al-Buldan* and *Ansab-al-Ashraf*. *Futuh-al-Buldan* deals with the record of Muslim conquests and also describes the subsequent history of the countries concerned. His other book *Ansab-al-Ashraf* (book of lineage of nobles) which was originally printed in 40 volumes is still in existence in Constantinople. The method followed in this book was to collect narratives dealing with particular events. The division of history into episodes makes the author go backward as well as forward in time. This work forms a link between the separate narratives of Madaini and the continuous history of Tabari.

Abu Hanifa Dinawari was an authority on astronomy and botany and also left behind valuable works on mathematics, geography, philosophy, literature and history. He wrote a work in 13 volumes on the Quran. Yaqut in his dictionary of authors gives a long list of books written by Dinawari on diverse subjects. His *Al-Akhbar-al-Tiwal* (Long narratives) is a universal history up to the period of Mutasim.

Another historian of this period Abdulla bin Muslim bin Qutaibah (213—270 A. H.) was the Kazi of Dinawar. He wrote several important treatises on literary subjects including *Adab al-Katib* which is one of the three authoritative works on literature, the other two being *Kamil* of Mubarrad and *Bayan* of Jahiz. His historical work entitled *Kitab al-Ma'arif* (Book of Knowledge) is a storehouse of information about the Holy Prophet and Arab genealogical table. He also wrote *Book of Sovereignty*

and Government dealing with the history of the Islamic Empire upto the time of Harun-ar-Rashid.

Ahmad bin Ishaq bin Jafar Yaqubi, a great admirer of the house of the Prophet, devoted much space to their wise sayings. His arrangement of facts by reigns is a more modern system than that used by Tabari who arranged his events chronologically.

Muhammad Ibn Jarir Abu Jafar al-Tabari (838—923 A. D.) is recognised as the father of Islamic history and as one of the world's greatest historians. Born in Tabaristan, the mountainous district of Persia situated alongside the Caspian Sea coast, Tabari is said to have learnt the Quran by heart at the age of seven. He received his education at Rayy, Baghdad, Wasit, Basrah, Kufa and Fustat (Cairo). He made extensive study tours of Persia, Iraq, Syria, Palestine and Egypt in quest of knowledge and to collect data for his historical works.

On one occasion he had to sell the sleeves of his shirt to buy bread. According to Yaqut (Volume VI, page 424) for forty years Tabari wrote 40 pages daily. Yaqut says that Tabari was contemplating the writing of two books—a history and a commentary on the Holy Quran of 30 thousand pages each, but his friends advised him that human life would not be sufficient to write as well as to read through such gigantic works. Hence, Tabari reduced the two books to 1/10, i.e., 3,000 pages each. Tabari lived for 85 years, died in 923 A. D. and was buried in

Baghdad. Among his pupils was Ahamd bin Kamil, the person to whom Miskawayh owes his guidance on history.

Among his works on diverse subjects, the two most outstanding which influenced later writers are the exhaustive commentary on the Quran and his universal history. His commentary on the Quran comprising about 3,000 pages is a standard book, and includes the largest collection of exegetical traditions. His monumental work is the universal history, which according to George Sarton is 'remarkably elaborate and accurate.'[1] "All the books were eclipsed by the *Annals* of Tabari, whose fame lasts up to the present time—The value of this book is very great—The author's selection of traditions is usually happy and the most important episodes were treated with most fulness of details."[2] Several translated and abridged editions of the *Annals* of Tabari have been published. One of these in 13 volumes was published in Leyden. His history begins with the creation of the world and continues up to 302 A.H. (915, A.D.). This was the first elaborate and complete historical work in the Arabic language and was the chief source of information and guidance for later historians including Abul Fida, Ibn Athir, Miskawayh and Ibn Kamil. He arranged the events chronologically and his annalistic method was followed by Al-Waqidi, Miskawayh, Ibn Athir and Abul Fida. It is said that his original work on history was 10 times more voluminous than the surviving one. His other

[1]An Introduction to the History of Science, Vol. I, page 642.
[2]Encyclopaedia Britannica, Edition XI. Vol 21, 'Tabari'.

works include his voluminous legal treatise *Ikhtilaf* comprising 3,000 leaves, *Tahdhibul Athar* dealing with the traditions of the Prophet and *Al-Baist*, a jurist treatise.

Abul Faraj al-Isfahani (897—967 A.D.) wrote *kitab al-Aghani*, a store-house of information on Arabic poetry, music and archaeology. It is an invaluable work on Arab antiquity, which has been called the "Register of Arabs" by Ibn Khaldun.

Arabic historical composition reached its highest point in Tabari and Masudi. Abul Hasan Ali al-Masudi (912—957 A. D.) known as the 'Herodotus and Pliny' of the Arabs introduced the critical study of historical events and instead of grouping his events around years he grouped them around dynasties—a treatment which was later elaborated by Ibn Khaldun. He was very broad-minded, and had a profound knowledge of the rise and fall of the innumerable dynasties of the world. "He was also one of the first to make good use of the historical anecdotes." Masudi made an extensive study tour and wandered throughout the Islamic world in quest of first hand knowledge which enabled him to write his memorable work in 30 volumes known as *Muruj al-Dhahab wa Madinal Jawahir* (Meadows of gold and mines of gems). "In this encyclopaedic historio-geographical work," says Philip K. Hitti, "the author, with catholicity and scientific curiosity, carried his researches beyond the typically Muslim subjects into Indo Persian, Roman and Jewish history."[1] His other

[1]History of the Arabs, page 391.

notable work *al-Tanbih wal Ishraf* outlines his philosophy of Nature and his theory regarding evolution.

Fourth century

The fourth century of the Islamic era, was also a period of great intellectual activity, which witnessed the rise of the Buwayhids, who were great patrons of learned men.

Ibn Miskawayh who died in 1030 A. D. is distinguished for treating history as an organic whole, displaying its human and instructive aspects. Miskawayh who held a high office in the court of the greatest of the Buwayhid, Abdul al-Daulah, is indebted for his historical knowledge to Ibn Kamil, the biographer and disciple of Tabari. He was a philosopher and physician, and ranks among the leading Muslim historians. His universal history (979-80) known as *Tajarib al-Umam* deals with the period from earliest times to 980 A. D., and the last two volumes, according to a western critic, "contain original material and show him a writer of great talents." Miskawayh wrote copiously and informatively on the economy, taxation and military matters of the states. "He is singularly outspoken in his judgments and free from partisanship. Unlike Tabari, who is a theologian, he exhibits little religious partisanship", says a European writer.

The number of historical and biographical works written during the fourth century A. H. and after was very large. The most outstanding historians of this period were Masudi, Miskawayh, Beruni, Ibn

Athir, Abul Faraj Isfahani, Ibn Khaldun, Ibn Khalikan, Asakir and Suyuti. Beruni (973—1048, A.D.), the celebrated luminary of the court of Mahmud of Ghazna, wrote *kitab-al-Hind* which gives the most authoritative account of ancient India. The *kitab al-yamini* (history of Mahmud of Ghazna) written by Utbi (d/1036) set an example of rhetorical composition in history which was followed by Imam-ud-Din (d/1201) in his historical works about Saladin, and the Saljuq dynasty.

Ibn Athir (1160—1234 A. D.) is the celebrated author of *al-Kamil fi al-Tarikh* (The complete book of chronicles) which may be compared favourably with the best historical works of Europe. Another work composed by Ibn Athir known as *Asad al-Ghabah* (The lions of the thicket) is a collection of the biographies of the 7,500 companions of the Prophet of Islam.

Ali bin al-Hasan Ibn Asakir (499—571 A. H.) who died in 1177 A. D., was a great biographer. He travelled extensively like Khatib, another earlier historian. His greatest work is *al-Tarikh al-Kabir* dealing with the life of the great men of Damascus. Originally it was in 80 volumes, but at present it exists in 30 volumes only.

Another notable historian was Al-Jauzi (1186—1257 A.D.), a contemporary of Ibn Athir. He wrote *Mirat al-Zaman fi Tarikh al-Ayyam*, a universal history starting from the beginning of the world upto 1256 A. D. Taqiuddin Ahmad al-Maqrizi, a contemporary of Ibn Khaldun wrote a monumental work

on Egypt detailing the political, religious, social, commercial, archaeological and administrative conditions of that country. It is a mine of information on Egyptian antiquities and exhibits. Jalaluddin Suyuti was a prolific writer, who wrote 560 works on theology, history and philosophy. His *Tarikhul Khulafa* is a popular history book on the subject.

The greatest historian of the later Abbasid period was Ibn Khalikan (1282 A. D.) the chief judge of Syria. His great biographical dictionary has earned international fame. Even before him Yaqut had written a dictionary of literati and Ibn Asakir had composed the life of the distinguished men of Damascus. But the biographical dictionary of Ibn Khalikan has earned a reputation for graphic description of personalities and clarity of vision hitherto unsurpassed.

Spanish Historians

Muslim Spain, which was the cradle of European civilization, has produced a number of well known historians. The history of Spain known as *Al-Matin* was written by Abu Maruan of Cordova in sixty volumes.

Abu Obaid Abdulla al-Bakri who flourished in Cordova and died in 1094 A. D., was a renowned geographer whose *Book on Roads and Provinces* is a geographical compilation containing historical and ethnographical informations. He also wrote a dictionary of ancient Arabia. Abu-al-Walid Abdulla al-Faradi (1332—1406 A. D.) was the foremost biographer of Spain who wrote *Tarikh Ulema Andalus.*

Ibn Said al-Qurtabi (1029—1070 A. D.) was a well known Muslim historian and astronomer of Spain who flourished in Toledo. In 1067-68, he wrote *kitab al-tarif li tabaqat al-umam*, an universal history. In another work, he dealt with the life and achievements of learned men—both Muslims and non-Muslims. Science received much attention in his historical work.

Lisan-al-din ibn al-Khatib (1313—1374 A.D.) was a contemporary of Ibn Khaldun. He held a high position under the Nasrid Sultan Yusuf Abul Hajjaj (1334—54 A D.) and his son. He was a victim of private intrigues. He was a versatile writer, who left behind him 60 works. The most important of these was his history of Granada.

Ibn Khaldun (1332—1406 A. D.) the talented Muslim philosopher of history and the greatest intellect of his age is one of the most outstanding thinkers that the world has ever produced. Being the founder of the science of sociology, Ibn Khaldun had the unique distinction of treating history as a science by supporting his facts with reasoning. "There is nothing in the Christian literature of the Middle ages," says a celebrated western critic, "worthy of being compared with it (Khaldun's history) and no Christian wrote a version with such clearness and precision on any Muslim State."[1]

Born in Tunis (North Africa) Ibn Khaldun had a chequered career during his early life, taking active

[1]Recherches Sur l'—Historic et la literature of d'Espogna an Moyen age', page 96: Ibn Khaldun by M. A. Enan, page 105, quotes Dozy.

part in the intriguing power politics of the small North African principalities, enjoying alternately the favour as well as disfavour of the rulers and at times taking refuge in the distant Granada. His revolutionary spirit, being fed up with the dirty politics of those times, was obliged to take a short respite of about four years in the suburbs of Tunis, where he completed his immortal *Prolegomena* in 1377 A. D. Thereafter he shifted to Tunis to finish his masterly work *Kitab al-Ibar* (World History). Here he could take advantage of the reference books available in the Imperial Library.

Ibn Khaldun has acquired world wide reputation and occupies the outstanding place amongst the galaxy of the world's historical philosophers. He is distinguished from the rest of the historians, because he treated history as a science and not merely as a narrative. He wrote history in the light of his new method of explanation and reasoning and developed it as a social philosophy. Explaining the art of writing history, Ibn Khaldun says in *Prolegomena*, "It is only by an attentive examination and well sustained application that we can discover the truth, and guard ourselves against errors and mistakes. In fact, if we were merely to satisfy ourselves by reproducing the records transmitted by tradition without consulting the rules furnished by experience, the fundamental principles of the art of Government, the Nature, even, of the particular civilization, or the circumstances which characterise the human society; if we are not to judge the wants which occurred in the distant times by those which are occurring under our eyes, if we

are not to compare the past with the present, we can hardly escape from falling into errors and losing the way of truth."[1] He being the originator of sociology, philosophical history and political economy, his works possess 'striking originality, recording a new system in the understanding and explaining the social phenomena as well as in understanding, criticising and analysing history.' He has divided his historical work into three parts. The first part known as his famous *Prolegomena* deals with society and its origin, sovereignty, the birth of towns and villages, trades, means of livelihood and sciences. This is the best part of the book, in which the writer ascends the summits of creativeness, reviewing the diverse subjects like political economy, sociology and history with striking originality and brilliance. The statement of Farabi about the origin of towns and villages is only theoretical, while Khaldun has viewed it from a social point of view. The third chapter of the book deals with the state and sovereignty. In it the learned author has propounded his advanced political theories which were later incorporated in the works of such celebrated political thinkers as Machiavelli and Vico. Machiavelli's *Prince*, written in the stormy days of Italy, a century later, bears a close resemblance to *Prolegomena* and it is probable that the celebrated Italian borrowed some of his ideas from the works of Ibn Khaldun. "At any rate", says Prof. Gumplowicz, "the priority must rightly be attributed to the Arab sociologist, as regards those counsels which

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[1]As quoted by M. A. Enan's, 'Ibn Khuldun'.

Machiavelli, a century later gave to the rulers in his *Prince*".[1]

The third part of his great historical work, *Kitab-al-Ibar* which comprises two volumes, deals elaborately with the history of the Berbers and other neighbouring tribes. It also contains the autobiography of the author, known as *Al-Taarif.* Before him autobiographies were written in diary form, events having no connection with each other. Ibn Khaldun was the first to write a long systematic autobiography. The *Al-Taarif* may favourably be compared with the autobiography of Benvenuti Cellini the well-known Italian artist. Both have an air of frankness in them. "Ibn Khaldun" writes De. Boer, "is undoubtedly the first who tried to explain fully the evolution and progress of society, as being caused by certain causes and factors, and to explain the characteristics of race, climate, the means of production, etc., and their effects on the formation of man's mind and sentiment, as well as the formation of society. In the march of civilization he perceives an organised internal harmony".[2]

Paying glowing tributes to Khaldun's genius and achievements, Philip K. Hitti writes, "As one who endeavoured to formulate laws of national progress and decay, Ibn Khaldun may be considered the discoverer as he himself claimed-of the true scope and nature of history or at least the real founder of the science of sociology. No Arab writer, indeed no European, had ever taken a view of history at once

[1]Gumplowicz: Apercus Sociologique's, page 217; M. A. Enan, page 134.

[2]Geschichte der Philosophic in Islam (1901), pages 177—84.

so comprehensive and philosophic. By the consensus of all critical opinion, Ibn Khaldun was the greatest historical philosopher Islam produced and one of the greatest of all time".[1] "Not only is he the greatest historian of the Middle ages", says George Sarton, "towering like a giant over a tribe of pygmies, but one of the first philosophers of history, a forerunner of Machiavelli, Bodin, Vico, Comte and Cournot".[2]

There was no dearth of Arabic historians and biographers after Ibn Khaldun. During the Ayyubid and Mamluk periods a number of comprehensive histories and biographies were written in Egypt. A number of brilliant historical works and chronicles were written during the Mughal period in India including *Ain-e-Akbari* of Abul Fazal and *Tozak-e-Jahangiri*, written by Emperor Jehangir. Mulla Badayuni and Ziauddin Barni were celebrated historians of the Muslim period in India.

Historiography has always been the favourite subject of study in Muslim Societies—both high and low. Its unique growth under Muslim patronage may be due to certain causes. "Historiography was instrumental," explains Franz Rosenthal, "in firmly planting into the hearts of a large number of Muslims the ideals and aspirations of Islam. Historiography also served to keep alive the memory of the significance of their distinctive national heritage for the various nations of Islam...... It always maintained a position in which it was able to stimulate a certain interest in valuable aspects of cultural activity which were in

[1]Histroy of the Arabs, page 568.
[2]An Introduction to the History of Science, Vol. III, Part 2, page 1775.

danger to be entirely eliminated from Muslim life. Besides in its close association with biography, historiography was the only effective vehicle in Islam for concrete self-expression and for the factual observation of life, for looking at life as it was and for analysing man and his aspirations as the sole source of cultural developments".[1]

Thus Muslims, being highly politically minded and immensely attached to their ancestral traditions have made great contributions to the development of historiography in the world.

[1]History of Muslim Historiography, pages 42-3.

POLITICAL SCIENCE

The conception of Political Science has undergone a great change since the time of Ibn Khaldun, the originator of modern sociology and politics. He gave a totally new outlook to political science and developed it on a different line—a line which was scrupulously followed by such great political scientists as Vico and Machiavelli. Politics as it is today, was foreign to the earlier mediaevel political theorists who confined their treatises to the record of the characteristics of a good ruler and his relations with his subjects. But, whatever, political thought existed during the Mediaevel era, owed its growth to the genius of such political thinkers as Al-Mawardi and Nizamul Mulk Toosi.

Even earlier, the instructions given by the Prophet of Islam and his worthy successors including Hazrat Omar Farooq and Hazrat Ali to their lieutenants and governors on the policy to be followed in the civil administration and towards their non-Muslim subjects will undoubtedly form an invaluable part of political administration for all times to come. In fact, the seeds of real democracy were sown by the second Caliph of Islam in the instructions which he had issued to his governors in which he asked them to live like common people. He himself practised what he preached and translated his ideas into practice. Mr. Gandhi once

asked the Congress Ministers of India to follow the ideals and example of the second Caliph of Islam.

The Abbasid Caliphate, which is considered the Golden Period of Islamic intellectual development produced some of the greatest Muslim historians who also wrote on political science. Abu Abdullah Muhammad Ibn Muslim Ibn Qutaibah who flourished in Baghdad and died in 889 A.D was the earliest Muslim writer on political science. He is the author of *Uyun Al-Akhbar*, a work in 10 volumes in which he has laid down the functions of the head of state and the principles which should guide him in selecting high functionaries.

Shihabuddin Ahmad Ibn Muhammad Ibn Ali Al-Rabi, was another political writer of repute who compiled his *Suluk Ul Muluk Fi Tadbir il Mamalik* during the reign of the Abbasid Caliph Mustasim in which he laid down his ideas about knowledge, sovereignty, the administration of justice, revolution, wealth and slavery. His writings are free from all partisanship.

Abu Nasr Farabi, was one of the greatest intellectual giants that the Muslim world has produced and, according to George Sarton was "conversant with the whole scientific Thought of his age. He was thoroughly versed not only in philosophy, logic, politics, occult sciences and sociology but also in mathematics, medical sciences and music".[1] He was an encyclopaedist, an outstanding mathematician and physician, an occult scientist, an eminent philoso-

[1]An Introduction to the History of Science, Vol. I, page 628.

pher and a distinguished musician. According to reliable historical sources he left behind him more than a hundred works on diverse subjects, but only 15 or 20 are still extant. He has written no less than five treatises on politics namely a 'Summary of Plato's Laws', *Siyasat al-Madaniyah*, *Ara ahl al-madinah al-Fazilah*, *Jawami al-Siyasat*, and *Ijtima'at al-Madaniyah*. In fact he has made a lasting contribution to sociology by writing his memorable work, *Ara Ahl al-madinah Fazilah*, (Epistle on the opinions of people of the superior city) thus paving the way for the immortal *Prolegomena* of Ibn Khaldun. It was translated and published by Dieterici as *Philosophia de Arabar* and later on as *Dur Mustarstaat Von Alfarabi*. Farabi has presented his conception of a model city in his well-known work *Siyasat al-Madaniyah* (Political Economy) in which he seems to have been inspired by the *Republica* of Plato and *Politica* of Aristotle. His ideal city is to be governed by wise men, who are perfect both morally and intellectually. He lays great stress on the happiness and high morality of the citizens of his model city. The book in 34 Chapters, translated and edited by Dieterici is of great sociological interest.

Ikhwan-al-Safa, a group of celebrated authors headquartered at Basrah during the second half of the tenth century A.D. compiled in 52 tracts, *Rasail Ikhwan-al-Safa*, the philosophical and scientific knowledge of their age. They divided politics into five parts namely the Prophetical, Monarchical, Public, Private and Personal.

Ali Ibn Muhammad Ibn Habib al-Mawardi born in Basrah in 1072 A.D. was an eminent statesman and a prolific writer on diverse subjects like Religion, Ethics, Literature and politics. The Abbasid Caliph Al-Qadir Billah (381—422 A.H.) held him in great esteem and Qaim bi Amrillah (391—460 A.H.) the 26th Abbasid Caliph of Baghdad had made him his roving ambassador. Al-Mawardi was a Political economist, and his monumental work *Al-Ahkam-us-Sultaniyah* occupies an important place amongst the political treatises written during mediaeval times. He wrote four treatises on Political Science, namely:—

(1) *Al-Ahkam-us-Sultaniyah.* (Laws concerning rulership),
(2) *Adab-al-Wazir* (Ethics of the Minister),
(3) *Siyasat-ul-Malik* (Kings Politics), and
(4) *Tahsil-un-Nasr-wat-Tajil-us-Zafar* (Facilitating the conquest and hastening victory).

Of these the first two books have been published. His *Al-Akham-us-Sultaniyah* which has been translated into several languages including French and Urdu is an invaluable work on Islamic public laws. The *Adab-al-Wazir* deals with the functions of the Prime Minister and lays down sound advice on public administration. He had much personal experience of practical politics, as, on several occasions, he was sent by the Caliph of Baghdad on diplomatic missions to neighbouring states. His wise statesmanship was, to a great extent, responsible for maintaining the prestige of the diminishing Caliphate of Baghdad over the too powerful and almost independent Saljuq and Buwayhid Amirs.

Abu Ali Hasan Ibn Ali Ibn Ishaq better known as Nizamul Mulk Toosi, was the celebrated grand Vazier of the Saljuq Ruler, Malik Shah. Being one of the ablest and most talented Prime Ministers that the Muslim world has produced, Nizamul Mulk Toosi ranks high among the great administrators and statesmen of the world. He was born in 1017 A.D. near Tus, received his higher education at Baghdad and successfully served as the minister of the two successive Saljuq rulers, Alp Arsalan and Malik Shah. He was a great patron of learning and was the distinguished founder of the world famous Nizamiyah University of Baghdad. He was the principal figure behind the glorious reign of Malik Shah Saljuqi. Nizamul Mulk wrote in 1092 A.D. for the guidance of Malik Shah, his monumental political treatise *Siyasat Namah* which stands as a landmark in the annals of political treatises written during Mediaeval times. Being an able administrator he has incorporated his practical experiences in this book which served as the 'Magna Charta' for an ideal state. It deals with such topics as kingship, judiciary, espionage, ambassadorship, the functions and qualifications of all classes of officers, etc. It was written in the Persian language and contained 50 Chapters.

Abu Hamid Al-Ghazali (1058—1111 A.D.) known as 'Algazel' in the west was one of the most eminent thinkers of Islam. Being appointed the distinguished Principal of the celebrated Nizamiyah University of Baghdad at an early age of 34 years, Imam Ghazali wielded great political, spiritual and social influence

over the world of Islam and was held in high esteem by the Caliph. But at last he was fed up with the artificiality and the pageantry which pervaded the social life of Baghdad. His soul yearned for something else which was not available in the theoretical knowledge obtained through books. So he resolved to make a spiritual pilgrimage and renouncing all his worldly comforts, left Baghdad and for a number of years roamed about like a hermit in quest of spiritual knowledge. He incorporated his experiences with truth in his brilliant work *Ihya al-Ulum* which inspired later writers and brought about the revival of Mysticism. In this immortal work he has exposed the so-called philanthropists and social workers whose charitable and social works are generally guided by selfish motives. He had tried to find out persons who were responsible for the social degeneration. He had a wide knowledge of the inner life of the ruling class as well as that of the religious heads and he has drawn his conclusions in these memorable words, "The morals of the subjects have deteriorated because the life of the ruling class has much degenerated which is the ultimate result of the moral weakness of the religious heads. The *Ulema* have sold their conscience to the lust of wealth and power". His political ideas are found in a number of his works including *Ihya al-Ulum*, *Manqidh Min Dalal*, *Tibr al-Masbuq*, *Sirr al-Alamain*, *Fatihah al-Ulum*,' *Kimiya-i-Saadah*, *Iqtisad fi al-Itiqad* and *Kitab al-Wajiz*. He had dealt with multifarious political and social topics which agitated the minds of mediaeval political thinkers namely democracy, constitution, judiciary,

functions of the head of state and its executive, slavery and civil administration.

The *Qabus Namah* dealing with the functions of the ruler and high functionaries of the state was written by Amir Unsur-al-Ma'ani Kaikaus Ibn Sikandar Ibn Washmgir in 1082 A.D. It is a political treatise of considerable importance.

Abu Bakr Muhammad Ibn al-Walid Ibn Muhammad Ibn Khalaf Ibn Sulaiman al-Turtushi (1060—1126 A.D.) known as Ibn Abi Randaqa is the author of the monumental political treatise, *Siraj al-Muluk*. It contains sixty-four Chapters, in which political thought has been subordinated to ethical considerations. This work had a great influence on contemporary and later political thinkers including the celebrated Ibn Khaldun.

As has been noted earlier, Ibn Khaldun, Muslim historian and political philosopher, was one of the greatest intellects of his age and one of the most outstanding thinkers of all times. His contributions to the study and development of historiography were of singular importance and have been described in a previous chapter. He also proved to have remarkable insight into social and political phenomena and advanced a number of political theories which were later accepted by other political thinkers.

Ibn Khaldun's summary of the qualities required of a ruler, as stated in his monumental work *Kitab al-Ibar* is worth quoting here: "The sovereign exists

for the good of the people.... The necessity of a Ruler arises from the fact that human beings have to live together and unless there is some one to maintain order, society would break to pieces". He observes that "there is a constant tendency in an oriental monarchy towards absolutism, towards unlimited power, so undoubtedly the tendency of the oriental governors was towards greater and greater independence of central authority". Earlier al-Mawardi had pointed out the unlimited powers of the governors during the declining period of the Abbasid Caliphate, when the governorship was acquired through usurpation and the central authority had little control over them. Ibn Khaldun was more realistic in his approach towards the solution of intricate political and social problems, at a time when the Muslim world was passing through the most critical phase of its existence.

The later political thinkers, both in the East and the West were deeply influenced by the writings of Ibn Khaldun.

GEOGRAPHY, TRAVELS AND EXPLORATION

Arabia being a barren peninsula, its inhabitants had always to depend on foreign supplies for the necessities of life, hence they had to undertake trips to distant countries like Egypt, Abbysinia, Syria, Persia and Iraq. It was an Arab caravan which brought Hazrat Yusuf (Prophet Joseph) to Egypt. Moreover, the fertile areas in Arabia including Yemen, Yamama, Oman, Bahrein and Hadari-Maut were situated on the coast, and the Arabs being sea-faring people took sea routes in order to reach these places and fulfilling their commercial ventures.

The birth of Islam opened a new vista for their enterprises and the vast conquests of the Arabs during the early decade of Islamic history served as a fresh stimulus to their adventurous spirits. The stories of the famous Arabian Nights including the one about Sindbad the Sailor, give a glimpse of the adventures of those fearless Arabs. It provides a slightly coloured account of the great voyages undertaken by Arab mariners as early as the 1st century A.H., and who, undaunted by the perils enroute, roamed about in stormy seas reaching such distant lands as Ceylon, Zanzibar, Maldives, Malaya, Java and Sumatra.

The *Haj* or the holy pilgrimage to Mecca was another factor which added to their geographical and commercial knowledge by providing social contacts

among the Muslims of various countries visiting Mecca every year. This pilgrimage provided not only the means for promoting religious unity but also contributed to strengthening the commercial ties among Muslim countries and led to the exchange of views and news among people of far-flung countries. In fact the *Haj*, which created an opportunity for a great international assembly each year has paved the way for Muslim commercial and geographical enterprises.

The invention of mariner's compass opened vast oceans for their enterprising voyages. Most European writers have credited the Chinese with inventing the mariner's compass, but according to the famous orientalist George Sarton, the Arabs were the first to make practical use of it, a fact which has been admitted by the Chinese themselves. Another celebrated orientalist, Philip K. Hitti, has endorsed the view expressed by George Sarton. "According to a statement of Sir R. F. Burton, it even seems that Ibn Majid was venerated in the past century on the African coast as the inventor of the compass".[1] Any way, the practical use of the compass has immensely contributed to the undertaking of distant voyages by Arab sailors, who had hitherto been confined to coastal trips. They now came out into the open ocean and roamed about in the Atlantic as well as in the Pacific, circled the African continent and touched even the shores of the New World. The frail boats were replaced by larger sailing ships and Arabs with the help of compass and other marine instruments braved the stormy seas.

[1] Legacy of Islam, page 96.

The golden period of Muslim geography, travels and explorations runs from the 9th to the 14th century A.D., in which a vast amount of travel and geographical literature was produced in the world of Islam, which ultimately paved the way for later explorations and discoveries by the Christian West. Writing in the *Legacy of Islam* J. H. Kramers says, "Europe ought to look upon them (Muslims) as its cultural ancestors in the domain of geographical knowledge of discovery and of world trade. The influence which Islam has exercised on our modern civilization in the spheres of action can be seen in the many terms of Arabic origin which are to be found in the vocabulary of trade and navigation. The measure of influence can only be proved by studying the historical development of the domain over which our actual geographical knowledge extends".[1]

Theorists

The works of Greek writers specially the *Almagest*, written by Ptolemy provided the starting ground for Arab geographers. Al-Khwarizmi, the eminent Arab scientist, who flourished during the reign of the celebrated Mamun-ar-Rashid incorporated some of the ideas of *Almagest* in his geographical treatise *Kitab Surat al-arz.* The book which has been preserved in Strassburg was edited along with a Latin translation by Nallino.

The simple geographical descriptions of numerous countries including their physical features, climatic

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[1]Legacy of Islam, page 82.



WORLD-MAP

From a manuscript of Ibn Hauqal (c. A. D. 975) copied in the year A. D. 1087

The south is at the top; the big sea to the left is the Indian Ocean, into which flow the rivers Indus, Tigris, and Euphrates; the smaller sea to the right is the Mediterranean with, on its north coast, the peninsulas of the Peloponnesus and Calabria. From the south comes the Nile and from the north the entrance of the Black Sea, which was thought to be connected with the Encircling Ocean.

conditions and the life of the people formed the subject matter of treatises compiled by early Muslim geographers. Ibn Khurdabaih wrote *Kitab al-Masaalik-wal-Mamaalik*; Al-Yaqubi compiled *Kitab al-Buldan*; Ibn al-Faqih also wrote *Kitab al-Buldan* and Ibn Rusta named his work *Kitab al-A'laq al-Nafisa.* These books contained simple facts about the countries in order to satisfy the practical necessities of travellers visiting such countries.

The foremost writer of such geographical treatises during this period was Abu Zaid Al-Balkhi who was an eminent scholar at the court of the ruler of Khorasan. He has the distinction of being the author of as many as 43 books including his *Suwarul-Aqaalim* a geographical work of considerable value which is not available at present. The book guided later writers on the subject.

Abu Yahya Zakariya Ibn Muhammad al-Qazwini (1203-83 A.D.) who wrote a book entitled *Ajaib-ul-Makhluqat wal-Gharaib-ul-Maujudat* which is a very systematic cosmographical work, and which, according to M. Streck, 'must be deemed as a work of fundamental importance and is quite the most valuable book that the Arab middle ages have given us in the field'. Al-Qazwini has dealt with the description of the earth together with its seven climatic regions in his other geographical treatise *Athar-ul-Bilad-wa-Akhbar-ul-Ibad.* The book also contains the climatic regions, physical features, life and history of the people of the countries dealt with. The voluminous geographical work written by the Spanish author Al-Bakri (C. 1067),

contained most elaborate information on ports and coasts.

Another geographer of repute is Hamdullah Mastaufi, the author of *Nuzhat-ul-Qulub* which deals with natural history, anthropology and geography. It has helped Mr. G. L. Stange in writing his book entitled *Lands of Eastern Caliphate.*

Explorers, Travellers and Writers

Abul Qasim Ibn Hauqal is the first traveller worth mentioning who, starting from Baghdad in 943, A.D. made an extensive tour of the Islamic countries and on his return incorporated his experiences in his geographical treatise, *Kitab al-Masaalik-wal Mamaalik.*

Another more famous traveller of the period is Shamsuddin Abu Abdullah al-Moqaddasi. Excepting Spain and Sind, Moqaddasi too toured the length and breadth of the Islamic world. He has put down his travel experiences in his celebrated geographical work *Ahsan-al-Taqasim fi Marifat al-Aqalim*—a rare book of its type. A. Sprenger has acclaimed him as *the* greatest geographer of all ages. The Asiatic Society of Bengal published the English translation of his famous work in 4 volumes between 1897 and 1910 A.D.

Abul Hasan Ali Ibn al-Husain al-Masudi is one of the great versatile figures of the Islamic world. He is a well-known writer and explorer of the East. He was still quite young when he travelled through Persia and stayed in Istakhar for about a year in 915

A.D. Starting from Baghdad, he went to India, visiting Multan and Mansura, returned to Persia and after touring Kerman again went to India. Travelling through Cambay, Deccan and Ceylon he along with some merchants sailed to Indo-China and China. On his return trip he visited Madagascar, Zanzibar, Oman and he reached Basrah where he settled afterwards and wrote his great work, *Muruj-al-Dhahab* (Golden meadows) in which he relates his rich experiences in a cheerful manner which amuses the reader. Masudi also visited the southern shore of the Caspian sea and travelled through Central Asia and Turkistan. Retiring to Fustat (old Cairo) he wrote his voluminous work *Mirat-uz-zaman* (Mirror of the Times) comprising 30 volumes in which he elaborately described the geography, history and life of the people of the countries he had visited. He toured Gujrat in 303 A.H. According to him, Chemur, a port of Gujrat was inhabited by more than 10 thousand Arabs and their descendants.

Among the great mariners of the 10th and 11th centuries A.D., Sulaiman al-Mahiri and Shahabuddin Ibn Majid occupy outstanding positions. They not only roamed about in the Indian, Pacific and Atlantic oceans, but also toiled around the African continent and probably even touched the shores of the New World. Sulaiman reached as far as the Behring Strait and has penned his valuable experiences in a number of books, of which *Al-Umdat al-Mahriya fi Zabt-il-Ulum-il-Bahriya* is well -known. The other mariner Ibn Majid was considered among the four sea lions of his time. Allama Syed Sulaiman Nadvi in his book

entitled *The Navigation of Arabs* has enumerated fifteen books written by Ibn Majid on Navigation. According to a western critic, Ibn Majid is one of the earliest writers of nautical guides and his elaborate geographical account of the Red Sea could not be surpassed even upto the present day.

Ibn Faldan was a traveller of the 10th century A. D.,who led an embassy sent by the Abbasid Caliph Al-Muqtadir Billah in 921 A.D. to the Bulgarian Monarch, and incorporated his experiences in *Risalah* which is one of the earliest regional accounts about Russia. During the eleventh century A.D., Abu Rehan Beruni, the celebrated thinker of Islam visited India, stayed there for a number of years, learnt the Sanskrit language and described the geography and the life of India in his memorable work *Kitab-al-Hind*. Regional geographies were also written during this period. Famous among them were the description of the Arabian peninsula by Al-Hamdani and of India by Al-Beruni. The works of travellers like Ibn Jubayr, Al-Mazini and Ibn Batuta are store-houses of geographical knowledge. Al-Mazini (1080—1170 A.D.) who visited Russia wrote *Tuhfat-al-balad*.

The most brilliant writer of the period is Al-Idrisi (1101—54 A.D.) who was employed at the court of the Christian king of Sicily. His book *Nuzhat-ul-Mushtaq* contained 70 maps. In the second abridged edition of Idrisi's book one comes across eight instead of seven climates which were to be found south of the equator. The world map drawn by Idrisi is of the traditional round type and the first translation of his book was published in Rome in 1619 A.D.

Yaqut-al-Hamavi (1179—1229 A. D.) compiled a big geographical dictionary named *Mujam-al-Buldan* which contains all geographical names in alphabetical order. It was published in 6 volumes in Leipzig (Germany) between 1666—73 A. D. Writing in the 'Introduction to the History of Science; George Sarton remarks, "The *Mujam al Buldan* is one of the most important works of Arabic literature. It is a store house of information not simply on geography, but also on history, ethnography and natural history. It is preceded by an introduction dealing with mathematical, physical and political geography, the size of the earth, seven climates, etc."[1]

The Spanish traveller, Ibn Jubayr visited Mecca and Iraq in 1192 A. D. He wrote his well-known book of Travels entitled *Rihlat-ul-Kinani* which is a unique book of its type in Arabic literature.

Abu Abdulla Muhammad (1304—78 A.D.), better known as Ibn Batuta was the greatest Muslim traveller. Born in Tangiers, he started his travels at the age of 20, and returned home at the age of 51. During these 31 years he covered about 75,000 miles which is equal to three trips round the globe. No explorer or traveller during mediaeval times had traversed so many miles during a lifetime. Starting from Tangiers he toured Egypt, Abbysinia, Northern and Eastern Africa including Mombassa. He crossed the great *Sahara* (Desert) and reached Timbuktoo. He describes an oasis in the *Sahara* (Desert) where people constructed houses of rock-salt roofed with camel skins. In

[1]An Introduction to the History of Science, Vol. II, Part 2, page 642.

Europe he visited Spain, the Eastern Roman Empire and Southern Russia and sailed in the Mediterranean and the Black Seas. There hardly was a Muslim country in Asia, which Ibn Batuta had not seen. He made many tours of the Arab countries and performed *Haj* (Holy pilgrimage to Mecca) four times. In addition he travelled in Persia, Turkistan, Afghanistan, India, Maldives, Ceylon, East India, Indo-China and China. According to him Aden was a great commercial centre in those days and had a good system of water-supply. He travelled as far North as Bolghar (54°'N) in Siberia, in order to see the shortness of summer nights and desired to travel into the land of darkness (extreme North of Russia), but abandoned his visit due to certain reasons. He stayed for eight years in India, as the State Qazi of Muhammad Tughlaq in Delhi, but had to flee to Deccan in order to save himself from the indignation of the Emperor. He took part in the conquest of Goa and visited Maldives where he was made Qazi and married four wives. He relates interesting stories about India. Hindus in those days drowned themselves in the sacred waters of the Ganges in order to gain *Baikunth* (Paradise). On his first sight of Sati he was so overwhelmed with emotion that he almost fell off his horse. He met a very old man in the Hindukush mountains, who was said to be 350 years old and got a new set of teeth after every 100 years.

Explorations and Discoveries

Muslims may claim due share in the exploration of vast oceans and the discoveries of far off lands.

But the difficulty is that the achievements of Muslims in this sphere of human activity are not generally known to the world. The largest collection of literary and artistic treasures accumulated during the five centuries of the Islamic rule, perished at the time of the fall of Baghdad. The invaluable manuscripts were consumed to ashes by Hulagu Khan and his Mongol hordes. The cream of Muslim civilization met a similar fate in Spain, at the hands of Christian conquerors. Modern research has now begun to lift the veil from the face of mediaeval ages and the achievements of the Muslims now are revealed in all their glory.

"At a time when Europe firmly believed in the flatness of the Earth," says Ameer Ali, "and was ready to burn any foolhardy person who thought otherwise, the Arabs taught geography by globes".[1] Their progress in mathematical geography was no less remarkable. The works of Ibn Hauqal, Makrizi Istakhri, Masudi, Beruni, Idrisi, Qazwini, Wardi and Abul Fida contain store of geographical knowledge—specially on this branch of science, called by them "*Rasnul Ard*".

Rotation of the Earth

The rotation and sphericity of the earth were discussed and proved by the Muslim geographers of mediaeval times. The *Kitab Kalimat-ul-Ain* deals with the rotation of the earth which causes day and night. Muslim astronomers also proved that the

[1]Spirit of Islam, Ch. IX.

earth is a sphere and has a shape like a peach. Globes were commonly used in Arabic schools of mediaeval times which testifies to the contention of the sphericity of earth advanced by Muslims. Geography of the world was also taught with the help of globes in Moorish Spain.

Knowledge of Seas

Arab Mariners and explorers had a very wide knowledge of seas and oceans. The greatest discovery of the Arabs was that the oceans are connected with one another and form a compact oceanic world. The first sea route described by Sulaiman al-Mahiri started from the Indian Ocean and passing through the Pacific Ocean, Behring Sea, Arctic Ocean and Atlantic Oceans entered the Mediterranean Sea through the Straits of Gibraltar. The other route was easier. Starting from the Indian Ocean and passing through the Abbysinian Sea, Mozambique channel and encircling the Cape of Good Hope it entered the Atlantic Ocean. Passing through the Straits of Gibraltar it entered the Mediterranean Sea This was the route used by Vasco De Gama in 1498 A. D. This shows that the Arabs were the masters of the seas and possessed maps of seas and oceans which they freely used in their voyages.

Ibn Khaldun has stated the length of the Red Sea to be 1,400 miles, while according to current maps it is given as 1,310 miles. This shows that the speculations of Arab geographers came very close to modern research.

Behring Strait

The Behring Sea and Strait was known to the Arabs. The route described by Sulaiman al-Mahiri went from the Pacific Ocean to the Arctic Ocean passing through the Behring Strait. The celebrated explorer Al-Masudi has also mentioned the Behring Sea in his works. Among the Arabs it was known as 'Warang' sea.

According to the Encyclopaedia of America the geography of equatorial Africa and the issuing place of the river Nile was known to the Arabs for a very long time.

Arab Pilot of Vasco De Gama

In 1498 A. D. Vasco De Gama discovered a new route to India by passing through the Cape of Good Hope. Prince Henry of Portugal had established his nautical academy at Cape St. Vicent under the guidance of Arab and Jewish teachers which prepared the ground for the explorations of Vasco De Gama. It is now a well-known fact that an Arab had piloted his ship to India. Writing in *Legacy of Islam*, J. H. Kramers says, "when Vasco De Gama, after his circum-navigation of Africa in 1498, had reached Malindi on the East Coast of Africa, it was an Arab pilot that showed him the way to India. According to Portuguese sources, this pilot was in possession of a very good sea-map and of other maritime instruments. Arabic sources of that time also knew the story; they state that the pilot, whom

they knew under the name of Ahmad Ibn Majid, could only be induced to show the way to the Portuguese after having been made drunk".[1] Reporting from Baros, a Portuguese who was a member of the party of Vasco De Gama, writes in the *Encyclopaedia of Islam:* "When Vasco De Gama reached Malindi a Moor (Arab Muslim) called on him. Being much pleased in our company and with the idea of winning the favour of the king of Malindi who was in search of a pilot for the Portuguese ship, he (Arab Muslim) agreed to pilot our ship to India". According to the earned author of the *Encyclopaedia Britannica*, a local hand had piloted the ship of Vasco De Gama to India. He is either shy of associating the name of a Muslim with the much advertised exploration of Vasco De Gama or is ignorant of such a vital fact which may hardly be expected from an author who has undertaken such a gigantic work.

The discovery of America

Modern research has proved beyond doubt that the Arabs discovered America. Muslim Geographers and astronomers believed in the sphericity of the earth. The trigonometrical tables of Khwarizmi were translated by Adelard of Bath, Gerard of Cremona and Roger Bacon. The famous book *Imago Mundi* published in 1410 A. D. incorporated the Ain (or Arim) theory from the translations of Khwarizmi. It was from this book that Columbus learnt that the earth was pear-shaped and that there must be some

[1]Legacy of Islam, page 96.

elevated part on the other side of the earth which he decided to discover. "Thus Islamic geographical theory", observes J. H. Kramers, "may claim a share in the discovery of the new world".

Modern research on the subject has gone a step further and has established that the Arabs discovered America five centuries before Columbus. The following important news was published in leading Indian newspapers including the *Delhi Express*, dated 11th August 1952:—

"A leading South African anthropologist says the Arabs, not Christopher Columbus, discovered America. The Arabs scored a beat of nearly 500 years on Columbus, according to Dr. Jeffreys, Senior lecturer of Social Anthropology at Witwatersand University. Dr. Jeffreys based his claim on a discovery 18 months ago of Negro Hamitic skulls in the Rio Grande River."

The professor said, 'Puzzling things previously inexplicable suddenly made sense and fitted a jigsaw puzzle'.

"Dr. Jeffreys thinks that by 1000 A. D. Arabs already commanded the Mediterranean, were established on the west coast of Africa and had settled in America. Columbus, too, found small colonies of Negroes in the Darian Isthumus who, according to Dr. Jeffreys, were descendants of Arab slaves."

"He said the discovery of Hamitic skulls in caves in Bashama Islands and African root crops in the Carribean lend credence to this theory."

The celebrated anthropologist of South Africa, Prof. M. D. W. Jeffreys' article has been published in various journals of the world in which he has given weighty proofs that Arabs had discovered America and had settled in Carribean islands long before the arrival of Columbus. He says, "There is an old Portuguese tradition that when the Portuguese were exploring the coasts of Guinea (West Africa) under King John II, who died in 1495, these explorers brought maize, an American plant from Guinea to Portugal.... As maize must have reached Guinea from America to introduce it to Portugal before Columbus sailed from Spain, it is clear someone must have brought it from the Americas, and I claim it were the Arabs who did so".[1]

In the same way banana was carried by Arabs to Carribean islands and American mainland. Peter Martyr, a friend of Columbus, published his first Decade before 1504 A.D. In it he describes the banana as it appeared in the West Indies when the Spaniards arrived. He writes: "It (banana) was brought from a part of Ethiopia called Guinea, where it grows wild, as in its native country."[2] It were the Arabs who introduced the banana to Guinea (West Africa) and therefrom carried it to Carribean islands and American mainland. Reynold writes: "The Arabs were instru-

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[1]As quoted by Prof. M. D. W. Jeffreys in his article published in *Voice of Islam*, Karachi, Vol. III, No. 6, Page 217-219.

[2]Ibid.

mental in distributing the banana across equatorial Africa, so that it was well-established on the Guinea coast when the Portuguese first explored there in the years 1469—1474 A.D."[1]

Moreover the Atlantic islands were known long before the discovery of Columbus. The Arabic names of these islands in the geography published by a Franciscan Friar in 1350 A.D. prove that most of these were inhabited by Arabs and their descendents, e.g., Lost Islands were named Kalidat, Teneriffe was named Elburd. The word Brazil too has Arabic origin. Armando Cortesao, formerly counsellor for the History of Science at UNESCO has published a book called *The Nautical Chart of* 1424, in which he has named several islands which have Arabic origin e.g., Antilia, Saya and Ymana.

The celebrated Geographer Idrisi had published his well-known geography *Nuzhat-al-Mushtaq* about 1151 A.D. Idrisi in his geography gives a hint that the Arabs knew the Americas. The western orientalist Glas, writing in 1764 A.D. of Idrisi, whom he calls the Nubian geographer admits: "Anyone who reads with attention the first part of the Nubian Geographer's Third Climate will be strongly inclined to believe that the Arabs had even some knowledge of America or West India Islands".[2]

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[1]Ibid.

[2]Ibid.

INDUSTRIAL PROGRESS

The achievements of Muslims in the industrial field had not been less spectacular than those in the political and intellectual spheres. The Muslims during the Caliphate of Abbasids and Omayyads in Spain had developed their industries to such a high degree of perfection that their finished products were viewed with wonder at the imperial courts of Europe. The watch presented by Harun-ar-Rashid to Charlemagne, emperor of France was regarded as an object of wonder. Their manufactured goods had captured the markets of the known world, and their fabrics formed the favourite dresses of the ladies of the imperial houses of Europe. But, the west has always taken pains to minimise the achievements of Muslims, and John William Draper has rather gone out of the way, in his outspoken book *The Intellectual Development of Europe* when he says, "I have to deplore the systematic manner in which the literature of Europe has contrived to put out of sight our scientific obligations to the Mohammedans. Surely, they cannot be much longer hidden—The Arab has left his intellectual impress over Europe, as, before long, Christendom will have to confess; he has indelibly written it on the heavens, as any one may see who reads the names of the stars on a common celestial globe"[1].

[1]Intellectual Development of Europe, Vol. II, page 42.

The genius of the Arabs, who formed the vanguard of human civilization during mediaeval times, manufactured novel things and organised large-scale production of commodities which were liberally supplied to different parts of the world. Their enterprising merchants carried their finished products to the outermost parts of the world. The merchant navy of Muslim Spain alone comprised 1,000 ships.

Abbasids

The Abbasid Caliphate provided the most congenial atmosphere for the intellectual, cultural and industrial developments of the Muslims. It was in this period that the Arabs were given the fullest opportunity to display their talents in different walks of life. Harun and Mamun were the greatest patrons of arts and sciences during mediaeval times. Mutasim is particularly known for the interest he exhibited in the industrial enterprises of his empire. He had many industrial projects executed during his lifetime and a large number of factories were established in Iraq. Manufactures of every kind were encouraged and fostered. The glass and soap made in the factories of Basrah were famous throughout the world. During the reign of Mutasim Billah, a large number of factories sprang up round about Baghdad and in other important cities of Iraq. The paper industry particularly received much impetus, and in important paper factories, skilled workmen from Egypt were employed. Persia was noted for her gold and embroidery work, which was carried on in all the big cities. High class fabrics including satin brocade, silk and carpets were manufactured in Islamic domains and

were in great demand all over the world. Kufa was famous for its silk and silk handkerchiefs known as *kuffiyeh.* Khuzistan (ancient Susiana) produced superfine cloth. "The beautiful brocade of Toster", says an eminent orientalist, "the rich carpets of Korkub and the silks and satins of Sus were in request all over the world. The other provinces were equally famous for their splendid manufactures. Susangrid contained a royal factory for gold embroidery of *damask*, camel-hair fabrics and carpets. It also produced embroidered curtains made of spun silk (*kazz*) for the sultan, and raw silk, camel and goat hair materials. Here were manufactured splendid cloaks of spun silk, considered superior to the striped woollen cloaks of Shiraz. The wealthy cities of Khorasan were active in the production of brocades, carpets, rugs, hangings, coverings for cushions, and woollen fabrics of all kinds. In short every city in the empire had its own particular manufacture in metal, glass, wool, silk or linen. Syria was famous for its manufacture of glass, and as early as the second century of the Hejra parti-coloured and enamelled glass was produced".[1] Jundeshapur was the seat of the first observatory and the first college of natural sciences in the world. This college gave an impetus to the development of industry and commerce. The chemical research in this college led to the knowledge of sugar refining which was successfully applied to sugar industry in Khuzistan and later on in Spain. Spain produced high class sugar. The commodities exported during Abbasid Caliphate were agricultural

[1] A Short History of the Saracens, page 424-25.



An old Turkish embroidery, performed by a countrywomen of Anatolia.

produce, glass, hardware, silk, textiles, perfumes of all kinds, rose water, saffron, syrup, oil, etc.

Spain

The Muslim kingdom of Spain had become a very prosperous State due to the extensive industries developed there and the large-scale production carried on in the factories. Her revenues obtained through commercial duties, according to a European author, exceeded the entire revenues of all the Christian states of Europe taken together. "Spain under the Caliphate" according to Philip K. Hitti, "was one of the wealthiest and most thickly populated lands of Europe".[1] Cordova, the capital of the Moorish State had 13 thousand looms and a flourishing leather industry. The art of tanning and embossing leather had been developed to a high degree of perfection and from here it spread to Morocco, England and France as the terms 'Cordovan', 'Cordwainer' and 'Morocco' indicate. The celebrated Spanish historian Maqarri has written that high class woollen and silken fabrics were manufactured not only in Cordova, but also in Malaya, Almeria and other towns. Almeria also produced glassware and brasswork. Sericulture was much developed in Spain. According to Ibn Khatib, Valencia was the home of pottery. Mining industry was fully developed. Jaen and Algrava were famous for their mines of gold and silver, Cordova for its iron and lead and Malaga for its rubies. According to Ibn Hauqal 'Toledo like Damascus was known throughout the world fori ts swords? "The art of

[1]History of the Arabs, page 592.

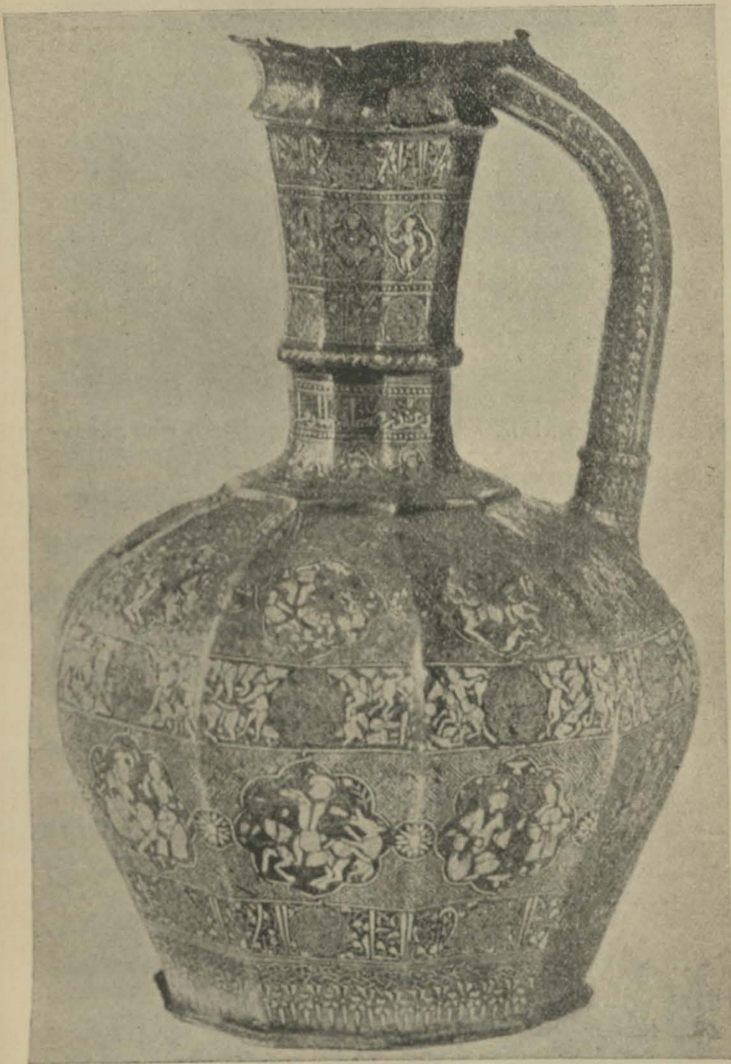
inlaying steel and other metals" says a celebrated western orientalist "with gold and silver and decorating them with flower patterns, which was introduced from Damascus, flourished in several European and Spanish centres and left a linguistic heritage in such words as 'damascene' 'damaskeen', French 'damasquiner' and Latin 'damschina'.

Muslim Spain was a leading State in textile industry. It produced high class cotton, woollen and silken fabrics, which captured the European markets. Cordova had 13,000 and Almeria 4,800 looms. "In the development of sumptuous textile arts" writes Philip K. Hitti "which made Arabic speaking people the leading fabric makers and silk mercers in the mediaeval world, the Arabs of Spain had a share, but in carpet making Spain offered no serious competition to Eastern, specially Persian market".[1] The word *muslin* has been derived from the word 'mussolina' a cotton fabric supplied to Italy from al-Mausil. The fine silken fabric supplied by Baghdad to Italy was called *Baldacoo* or *Baldachin* and it was used in the decoration of big churches of Europe. Similarly during the 13th and 14th centuries, A.D. Granada, the capital of the last Muslim kindgom in Spain supplied European dress shops with *grenadines*. Muslim workmen were mainly responsible in setting up textile industry in France and Italy.

The Moors had converted the barren lands of Spain into a garden and agriculture was developed

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[1]History of the Arabs, page 592.



BRASS EWER INLAID WITH SILVER
Mosul. Dated 1232. British Museum.



BRASS WRITING-CASE INLAID WITH SILVER AND GOLD
Mosul School. Dated 1281.



BRASS SALVER INLAID WITH SILVER
Venetan. XVth century.



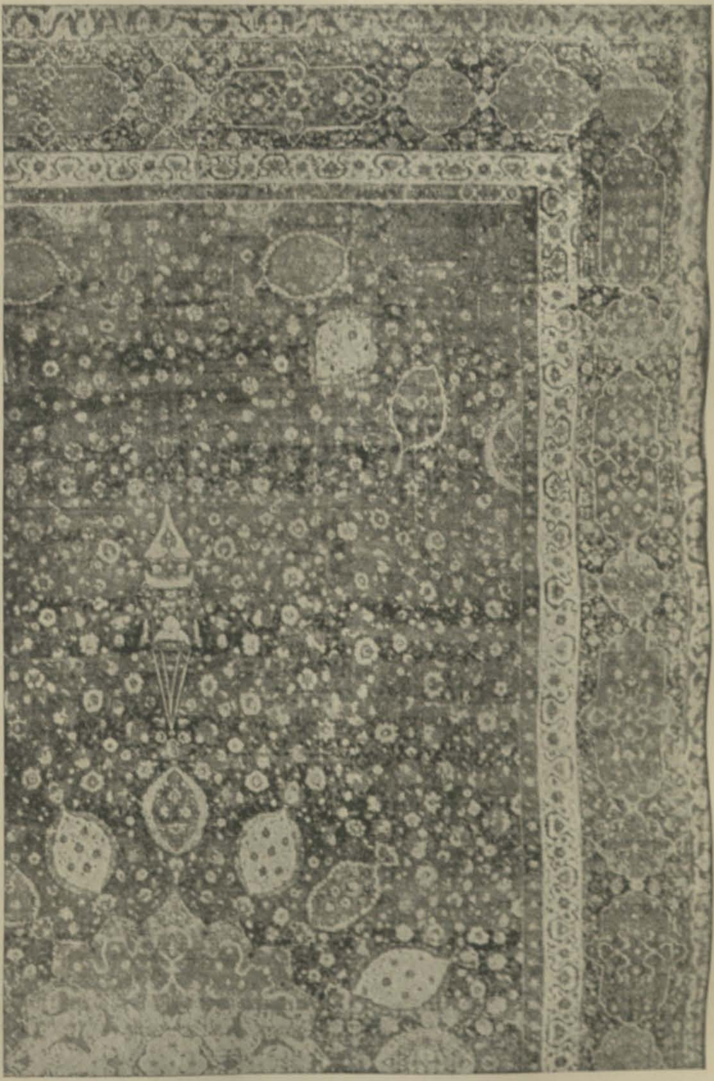
SILK FABRIC
Asia Minor. XVIth century.



SILK VELVET
Atalian. XVIth century.



SILK VELVET
Woven by William Moris in 1884.



PILE CARPET FROM THE MOSQUE AT ARDABIL
Persia. Dated 1540. Victoria and Albert Museum.

to a high degree. Agricultural industry also flourished in Spain. Seville alone had several thousand oil factories. Besides the textiles and agricultural industries, paper, porcelain earthenware, iron, steel and leather industries were carried on on an extensive scale. The tapestries of Cordova, the woollen stuffs of Murcia, the silk of Granada, Almeria and Seville, the steel and gold work of Toledo and the paper of Salibat were sought all over the world. It was the Arabs who introduced the manufacture of silk and cotton fabrics in Spain. They had specialised in the art of dyeing and had invented black dyeing with indigo. The glazed tiles used in the palaces of Alhambra and the fine vases still found there bear ample testimony to their perfection in the manufacture of porcelain. The manufacture of gun-powder, sugar, and paper were introduced into Spain by Muslims.

Persia

Among eastern Muslim countries, Persia was noted for its fabrics and carpets. Even upto the present day, Persia has maintained an extensive carpet industry and Persian carpets are considered to be the best in the world. The Persians have proved themselves masters of decorative designs and colour applications since time immemorial. Their fine arts including potteries, tiles and other decorative things reached a high degree of excellence. Hunting and garden scenes were woven on Persian carpets and rugs.

India

During the reign of the great Mughals and even afterwards Muslims were the pioneers in cottage industries. Even today almost all the cottage industries in the Indo-Pak subcontinent are in Muslim hands. The muslin of Dacca, the woollen rugs (*shawl*) of Kashmir, the silken fabrics of Benares, the embroidery of Lucknow, the silver work of Bedar, the potteries of Multan, the furniture of Bareilly and the brassware of Moradabad are manufactured and maintained by Muslim craftsmen.

Fine Arts

"In the ceramics, another art as ancient as Egypt and Susa" says Gaston Migeon, "the reproduction of human form and of animals and plants as well as geometric and epigraphic figures attained a beauty of decorative style unsurpassed in any other Muslim art".[1] Beautiful Kashani tiles with flowers painted on them were a speciality of Persia which were in great demand all over the world. "Among the Treasures of the Louvre", writes Philip K. Hitti, "the British Museum and the Arab Museum of Cairo are exquisite pieces from Samarra and Al-Fustat including plates, cups, vases, ewers and lamps for home and mosque use, painted with brilliant radiant lustres and acquiring through the ages metallic glazes of changing rainbow hue".[2]

Decorative articles of luxury were produced on a large scale in Persia, Iraq, Spain and Egypt and they

[1]As quotd by Hitti, page 423.
[2]History of the Arabs, page 423.



Top left—ENAMELLED GLASS BEAKER. Syrian. XIIIth century.
Below left—ENAMELLED GLASS LAMP. Syrian. XIVth century.
Right—ENAMELLED GLASS BOTTLE. Syrian. XIVth century.



ENAMELLED GLASS BOWL AND COVER
Syrian. XIVth century.



SILK FABRIC
Baghdad. Late Xth or early XIth century.

adorned the palaces of the nobles and rulers of the world. A goblet of the palace of Fatimids was sold for 360 dinars. Decorative writings were painted on glasses which were hung in palaces and mosques.

The jewellery industry also flourished during the time of the Abbasids. Harun-ar-Rashid had purchased a ruby for 40,000 dinars and Yahya Ibn Khalid once offered 70,00,000 dirhams for a jewel box. Persia and Spain were the great centres of fine arts industries. The Hispano Moresque school excelled in metal work. One of such relics of the time of Hisham II (976—1009 A.D.) is preserved on the high altar of the cathedral of Geroma in the form of a wooden casket sheathed with silver gilt plating patterned in responsory with scroll like foliation. According to a European writer in the application of coloured glazes to earthenware, Muslims were from an early period past masters. In Europe Valencia was the centre of ceramics and pottery industries. The potteries of Muslim Spain were later imitated in the Nertherlands and Italy. Glazed and coloured tiles were also produced in Spain and exported to European countries. Exquisite pottery was made in Toledo, Cordova, Malaga and Valencia.

Textiles

Textile industry flourished in almost all the Muslim countries. The fine woollen, cotton and silken fabrics including rugs, tapestries, satin, brocade (*dibaj*), sofa (*suffat*) and muslin manufactured in Muslim countries were matchless and were exported to all parts of the civilized world. These fabrics were

in great demand in the Imperial palaces of the East and the West. Persian carpets are still considered the best in the world. Writing in the *Legacy of Islam*, J. H. Kramers says "But at the time of Islamic prosperity it had made possible a development of industrial skill which brought the artistic value of the products to an unequalled height....It is curious to note, too, that the State robes of mediaeval German Emperors bore Arabic inscriptions".[1] During the Abbasid Caliphate carpets and textiles manufactured in Iraq and Persia maintained a high standard of workmanship. A rug costing 13,00,00,000 dirhams, set with jewels was made for the mother of al-Mutasim. A fabric called *Tabi* was introduced by the Arabs into Spain, which had a good market in Italy and other European countries. A number of factories were established in Tawwaj, Fasa and other cities of Faris where fine textiles, brocades, carpets and robes were manufactured. Toster and Susa, towns in Khuzistan had factories for the embroidery of 'damask', a silken cloth originated in Damascus—which was used to make curtains. Among the specialities of Khuzistan were woollen fabrics made of goat and camel hair and spun silk cloaks. Shiraz, the famous city of Persia was known throughout the East for its woollen cloaks and brocades. Khorasan and Armenia manufactured tapestries, sofas, curtains and cushion covers, while Bokhara was noted for its prayer rugs. Egypt also produced high class fabrics including *Dabiqi* and *Tinnisi* which had a high reputation in the world markets.

[1]Legacy of Islam, page 104.



CHASUBLE OF PERSIAN BROCADED SILK
XVIth century. The Orphrey is of Turkish silk damask.



SILK FABRIC
Italian. XIVth century.



SILK FABRIC
Chinese. XIIIth or XIVth century.

Other Industries

A large number of finished products and other articles were exported from Muslim countries. Even the small province of Tranxonia exported among other things soap, carpets, copper lamps, felt-cloaks, fur, amber, honey, scissors, swords, looms, tables, sofas, lamps, vases, earthenware and kitchen utensils. The Syrian towns—specially Sidon and Tyre were noted for their fine glass and metal vessels which were sought all over the world and were used as articles of utility and luxury. Ibn Batuta found Damascus as the centre of Mosaic and Kashani industry, which were used for decorative purposes in the construction of palatial buildings. The paper manufactured in Samarqand was considered to be the best in the world. The first paper factory in Baghdad was established by the end of 8th century A. D. Paper mills were founded in Egypt, Morocco and Spain before the end of 12th century A. D.[1] "From Muslim Spain" says a European writer, "in the 12th and 13th centuries, the manufacture of paper finally worked its way into Christian Europe". The Abbasid caliph al-Mustasim Billah was a great patron of industries. The keen interest shown by him led to the rapid industrialization of Iraq and other countries. He opened big soap and glass factories in Baghdad, Samarra and other towns.

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[1]The linen paper industry was well established in Xation, near Valencia (Muslim Spain) whence it passed into Catalonia and Province (France) and later into Triviso and Padua (Italy).

Mining

Mines were worked in almost all the Muslim countries. The rich mines of Spain yielded iron, copper, lead, gold, silver and rubies. Transaxonian mines yielded marble, mercury, rubies, asbestos and azurite. Karman had big lead and silver mines. Pearls were obtained from Bahrein, carnelian from Sana, turquoise from Neshapur, rubies from Badakhshan, iron from Mt. Lebanon, kaolin and marble from Tabriz. Syria and Palestine had large sulphur mines. Capable engineers and miners were employed in the iron mines of Khorasan (Persia) and lead and silver mines of Karman (Persia). Georgian mines yielded bitumen and naphtha. Thus the mineral resources of the Muslim countries were fully tapped and worked. The countries noted for their mining industry were Persia, Spain, Caucasia, Transaxonia and Palestine.

Ship Building

Arabs who were the greatest sailors and mariners of mediaeval times carried on an extensive sea-borne trade between the East and the West. To meet this increasing sea-borne commerce, ship-yards were built in all the important ports of Muslim countries, which were called *Darul Sanayeh*. The ports of Abla and Siraf in the Persian Gulf, Tunis on the North African Coast, Dania in Spain,- Sus in Morocco, Palermo and Messina in Muslim Sicily, Bari in Muslim Italy and Acre in Syria had ship building factories. During the Omayyad caliphate such a

factory was founded in Ashbilia (Syria) and during the reign of Abbasids a big ship building yard existed in Sus. The celebrated conqueror Saladin had established a large ship building yard in Beirut to enable him to meet the challenge of the crusaders. Egypt had several ship building yards. The first of this kind was established in 54 A. H. in Egypt. The Fatimid caliphs had ship building factories in Cairo, Alexandria and Diametta.

The skill of Muslim craftsmen has now been acknowledged by liberal European writers. Writing in his well known work *Intellectual Development of Europe* John William Draper says, "They (Arabs) also promoted many important branches of industry; improved the manufacture of textile, fabrics, earthenware, iron, steel, the Toledo sword blades were everywhere prized for their temper. The Arabs, on their expulsion from Spain, carried the manufacture of a kind of leather, in which they were acknowledged to excel, to Morocco, from which country the leather itself has now taken its name. They also introduced inventions of a more ominous kind—gunpowder and artillery. The canon they used appeared to have been made of wrought iron. But perhaps they more than compensated for these evil contrivances by the introduction of mariner's compass".[1]

R. Briffault says, "By and by the manufactures of the East were introduced and imitated in the Christian Europe. Silk looms were established in Norman Sicily. Venice copied with the aid of native crafts-

[1] Intellectual Development of Europe, Vol. II, page 43.

men the glassware of Antioch, Lyons the 'Damasks', Paris the 'Tapis Surrasins' and Rheims the linen of Syria. The rich dyes of the East were brought to Bruges, where they were used to prepare English wool for the market. The wares of Spain and Majorica led to the establishment of Italian factories for the manufacture of majolica. Sugar factories were transferred from Sicily to Italy and from Spain to south France".[1]

[1]*Making of Humanity*, page 207

COMMERCE

The Muslims, who, during modern times are considered to be backward in commerce and whose markets are mostly monopolised by foreigners, once commanded world trade. Their ships and caravans loaded with all sorts of merchandise reached the distant parts of the known world and their wealthy merchants were heartily welcomed in the imperial courts and cities of Europe and Asia. The famous *Arabian Nights* is full of stories of such commercial enterprises when Arab merchants in quest of 'El Dorados' roamed about the eastern seas reaching as far as the Behring Strait. Their ships even touched the shores of the New World. The influence which Arabian commerce had on Europe has now begun to be recognised by less partial research. "Europe owes much to its own force and initiative" says J. H. Kramers, "but it has also largely profited by the knowledge and the experience of those who were at one time the masters of the world. Therefore Europe ought to look upon them as its cultural ancestors in the domain of geographical knowledge, of discovery and of world trade. The influence which Islam has exercised on our modern civilization in these spheres of action can be seen in the many terms of Arabic origin which are to be found in the vocabulary of trade and navigation".[1]

[1]Legacy of Islam, page 82.

Oceanic Trade

The Mediterranean Sea during mediaveal times had virtually been converted into an Arabian lake. The Arab Navy and merchant shipping were the undisputed masters of this important naval thoroughfare. The Mediterranean, which on three sides was surrounded. by Muslim countries as well as its important islands like Sicily, Crete, Cyprus and the Baleric islands wer governed by Muslim rulers. They formed the main commercial thoroughfare of the west, through which an active trade with the Christian countries of Europe was conducted. Tunis and Alexandria, Cadiz and Barcelona were great ports of call which handled the flourishing trades. Speaking about Moorish Spain, J. W. Draper writes, "But in the days of their prosperity they maintained a merchant marine of more than a thousand ships. They had factories and consuls on the Tanais. With Constantinople alone they maintained a great trade; it ramified from the Black Sea and East Mediterranean into the interior of Asia; it reached the ports of India and China and extended along the African coast as far as Madagascar".[1] Islamic navigation had reached its zenith during the 9th century A. D. when Arab traders carried on a flourishing trade with the non-Islamic ports of South East Asia and Africa. Commercial navigation in the Mediterranean was mainly confined to Muslim ports.

It was during the Caliphate of Faruq the Great, that the idea of connecting the Mediterranean with

[1]Intellectual Development of Europe, Vol. II, page 44.

the Red Sea was given some practical effect in order to ensure quick transport of grain from Egypt to Hejaz. The Suez Canal which was partially opened was closed till the 18th century by the Abbasid and later caliphs, as there was a risk of western attack on the holy cities. Tunis in the days of the glory of the Spanish caliphate had grown to be the greatest commercial port on the African continent. Its safe waters anchored a fleet of merchant ships which sailed from there to Spain, Rome, Sicily, Alexandria and Syria. "A largely used word like *douane*" says a western writer, "is a reminder of the time when regular commercial intercourse had developed in different ports of the Mediterranean. It is well-known that this intercourse has also reacted largely on the commercial organisation of the western nations. The treaties which they concluded with the Muhammadan rulers, and the institution of consular representatives in eastern ports, have been important stages in the development of the rules that now-a-days govern international trade".

The ports on the Indian ocean carried on a flourishing trade with Iraq on the west and the East Indies and China on the east. It was the greatest commercial thoroughfare between the Far East and the Islamic west during the days of the Abbasids. The wealthy merchants of Baghdad, setting out from Basrah, a great commercial port, went as far as China and brought silk from China, spices and aromatics from India, coconuts, muscat nuts and tin from Kala which were also exported to Europe by these merchants. The big

waterways of Iraq were made navigable upto Baghdad, the metropolis of the Islamic empire. The merchants of Baghdad carried with them to the courts of Indian and Chinese rulers textiles, potteries, perfumes and rugs made in Islamic countries. African products including ivory and pepper were brought to the ports of Aden and Jedda. Surat, Goa and Calicut were large ports during Mughal times and handled an enormous trade between east and west. The Chinese town of Khanfu now called Canton was frequently visited by Muslim ships, and a Muslim colony was set up which became an emporium of trade with China. The enterprising Muslim traders went as far as Korea and Japan. They felt perfectly at home in those seas and climes. A lively traffic was kept up with Ceylonese and Malabar ports by Arab merchants. Saimur, an Arab colony had sprung up near Bombay by the end of 10th century A.D. and Daibul was an important port of Sind which had been conquered by the Arabs. The East coast of Africa and Madagascar were also frequently visited by Arab ships including the country of Sufala which was known for its gold. Zanzibar and Mombasa were the great ports of this region which exported ivory, pepper and other tropical fruits. It was here that the celebrated mariner Ibn Majid had met Vasco de Gama in 1498.A. D. and had piloted his ship to India.

Land Trade

The communications on land were carried on through caravans. The caravans were generally composed of horses and ponies and of camels in the

desert. The danger of bandits, obliged travellers to travel together thus forming a caravan. "The peace and security with which caravans traversed the Empire"; says Ameer Ali, "the perfect safety of the roads; the cisterns, and tanks and reservoirs, and rest-houses which existed everywhere along the routes—all aided in the rapid development of commerce and trade, arts and manufactures". It was through the caravans that flourishing trade was carried on among the cities of Islamic countries especially in Persia and Central Asia. During mediaeval times, caravan traffic was the most common means of trading and travelling between the different Islamic countries. There were important overland routes—one leading to India and China., the other to Central Asia and Russia and the third to northern, eastern and central Africa. Over these routes passed caravans loaded with rich merchandise.

The chief export of Eastern and Western Africa was gold. Al-Allaqi, a big commercial centre lying in the region of gold mines east of Aswan (Egypt) was known since ancient Egyptian times for its trade in gold. The gold country of Ghana situated in Western Africa in the basin of the river Niger also carried on an active trade of gold. The Muslim merchants of Morocco and North African countries crossed the great *Sahara* (desert) passing through Awdaghosht oasis, situated north of Ghana. This perilous journey through the largest desert of the world took several months, but the aspirers to this African El Dorado were prepared to face all risks. The celebrated geographer Ibn

Hauqal gives a graphic account of the trade in these regions. He alleges that "he saw in Awdaghosht an I.O.U. (the Arabic word is *sakk* from which the modern word cheque has been derived) for an amount of 42,000 dinars, addressed to a merchant in the town of Sijilmasa in southern Morocco". The volume of trade handled here was greater in the 9th century A.D.

The Muslims who were the pioneers in the commercial field during mediaeval times visited also the European countries as far as Scandinavia and Finland. Muslim coins found in large numbers in northern Europe provide ample testimony to this contention. According to the famous geographer Al-Maqaddasi, the merchants in this way purchased in Europe sables, miniver, ermines, furs, wax, birch, birch bark, fur caps, fish-glue, castoreum, amber, honey, hazel-nuts, falcons, swords, armour, maple wood and cattle. They supplied to European countries all sorts of manufactured goods including textiles, paper, rugs and pottery. Muslims had intimate commercial relation with the Christian states of Constantinople, Bulgaria, Germany and southern Russia. Jewish merchants, too, were very active in Islamic and Christian states. The Muslim traders brought to Europe musk, aloes, camphor and cinnamon and their names betray their oriental origin. The one overland route which connected central Europe with Asia passed through the Khazar empire in south Russia and Central Asia. Trebizond, an important commercial town on the border of the Byzantine empire was an emporium for Islamic-Greek trade. Moorish Spain had commercial relations with western Europe, and passing

through the Pyrenees the fine products of Muslim Spain had access to French and Swiss markets, as early as the 8th century A.D. Muslim merchants visited Italian towns and Constantinople, but by the end of the 11th century a really flourishing trade was carried on with these countries. "The great riches of material culture, which the Islamic world had gathered for nearly five centuries, were poured down upon Europe. These riches consisted not only of Chinese, Indian and African products, which the enterprising spirit of Islam had fetched from far distant lands; they were in the first place represented by what the Muhammadan countries themselves yielded of natural and industrial products".[1]

Muslim Spain, during the period of her glory maintained a flourishing trade with neighbouring countries. The revenues of Abdur Rahman III derived mostly from commercial taxes was about 6 million sterling, an amount which, according to a European writer exceeded the entire revenue of all the sovereigns of Christendom taken together. The Spanish ports of Malega, Carthegena, Barcelona and Cadiz were vast commercial emporiums of export and import. They possessed a merchant navy of more than a thousand ships and had commercial representatives in the Danubian states. An active trade was carried on with Constantinople, Rome and France. The Spanish merchants visited the ports of India, China, Madagascar, East Africa and the cities of Central Asia. "In the midst of the 10th century" says J. W. Draper, "when Europe was about the same condition

[1]Legacy of Islam, page 103.

that Caffraria is now, enlightened Moors, like Abul Cassem were writing treatises on the principles of trade and commerce".[1] The grain of barley was the smallest weight they used, a practice which is still prevalent. For providing correct data to the merchants and travellers, geographical registers, gazetteers and itineraries were regularly published by government agencies. Seville, the great river port in the fertile Andalusian province exported cotton, olives, and oil. The exports of Malaga and Jaen included saffron figs, marble and sugar. An active trade was carried on with Baghdad, Damascus, Hejaz and Alexandria. The Government of Spain had a regular postal service. According to Philip K. Hitti, "Arab money was in use in the Christian kingdoms of the north, which for nearly 400 years had no coinage other than Arabic or French".[2]

The large amount of Arabic coins found in European countries including Scandinavia, Finland, Russia, the British Isles, Baltic States and even as far as Iceland bear testimony to the sphere of influence which Muslim commerce had achieved in Europe. The coins belong to the period extending from the 7th to the 11th century A.D., when Islamic commercial and political advancement was at its zenith. The large number of Arabic words still found in the trade dictionaries of European languages, provide clear proof that those commodities were first introduced into European countries by Muslims. 'Tariff' is nothing

[1] Intellectual Development of Europe, Vol. II, page 44.

[2] History of the Arabs, page 529.

but the Arabic word *tariff* meaning announcement. The words 'risk', 'tere' 'calibre' and 'magazine' are of Arabic origin. Magazine is derived from the Arabic word *Makhazin* meaning stores. The 'cheque' has also an Arabic origin. The conception of joint stock companies was an innovation of Muslim brains, brought into practice by the partnership of Muslim and Latin Christian merchants.

"Finally, our commercial vocabulary itself has preserved" says J. H. Kramers, "some very eloquent proofs of the fact that there was a time when Islamic trade and trade customs exercised a deep influence on the commercial development in Christian countries".[1] The Arab opened up land and sea routes to India, China, Mallaca and Timbuktoo.

[1]Legacy of Islam, page 105.

AGRICULTURE

The scarcity of water has converted the barren Arabian peninsula into a vast desert which has never yielded any substantial agricultural produce. Her scattered population had always to fall back on foreign supply of foodgrains to supplement the dates and the little corn grown in their own lands. Agriculture in Arabia which has had the distinction of being the cradle of the great prophets of the world has been very primitive and was confined to those tracts where water was available in the form of springs. Taif, a hilly place is known as the garden of Hejaz, where, besides grapes, apples, figs, pomegranates and dates, wheat is also cultivated. Medina, with its springs and wells is a green spot in a vast desert, and dates, wheat and barley are cultivated there.

The great Prophet of Islam had left behind him a group of selfless people, whose sagacity and magnanimity, faith and unity, spirit of sacrifice and service won for them laurels not only on the battle-fields but in almost all branches of human activity. Agriculture was no exception and as early as during the reign of the second Caliph of Islam Arabs had made considerable progress in agriculture and had introduced many beneficial measures for its advancement in their dominions including Egypt, Syria, Iraq and Hejaz. Writing about the Spanish Muslims in his outspoken book *The Intellectual Development of Europe* John

William Draper says, "Not only did they attend to the cultivation of plants, introducing very many new ones, they likewise paid attention to the breeding of the cattle specially the sheep and horse. To them we owe the introduction of the great products, rice, sugar, cotton and also, as we have previously observed, nearly all the fine garden and orchard fruits, together with many less important plants, as spinach and saffron. To them Spain owes the culture of silk. They introduced the Egyptian system of irrigation by flood gates, wheels and pumps".[1]

It was during the reign of the second Caliph that the Arab conquest was extended over Asia and Africa. Arabs were confronted with new problems which the administration of such a vast empire had brought in its wake. They provided a test for the Arab genius and the manner in which they grappled with different problems including the exploitation of natural resources in their dominions proved beyond doubt that they were matchless both in war and peace. Hazrat Omar Faruq the Great, had fixed the rates of land revenue according to the type of land. He charged four dirhams on one *jarib* of sown wheat, while he charged 2 dirhams for a similar plot of barley. Nothing was charged for pastures and uncultivated land. In this way he systematised revenues which before his time were charged haphazardly. Different rules were framed regarding the revenues of Egypt whose agricultural output depended on the floods of the river Nile. According to reliable historical sources, the annual revenues of Iraq amounted to 860 million dir-

[1]Intellectual Development of Europe, Vol. II, page 43.

hams, an amount which was never exceeded after the death of the great Caliph though he was very lenient in his collection. The main reason behind the easy realisation of revenue was that the people had become very prosperous. He had introduced many far-reaching reforms in the field of agriculture, which we do not find even in most of the countries of modern times. One of these was the abolition of landlords or zamindari and the subsequent disappearance of the evils which were being wrought on the poor tenants by the vested landed interests. When the Romans conquered Syria and Egypt, they confiscated the land from the tillers of the soil and allotted it to the nobles, churches and the members of the royal family, and the armed forces. Hazrat Omar, upon conquest of these countries returned the land to those local inhabitants who were the rightful owners. The just and benevolent Caliph was exceptionally generous to the tillers of the soil and he even issued strict orders that no other persons including Arab soldiers who had spread all over these countries should be granted any piece of land for cultivation purposes. Such steps taken by the second Caliph of Islam restored confidence among the local inhabitants, gave a great impetus to the advancement of agriculture in those countries and contributed to the enormous increase in agricultural produce. The tenants became prosperous and their standard of living was raised which led to the easy realisation of land revenues by the custodians of the State. According to a French historian, "The liberal policy followed by the Arabs in the fixation of revenues and their land reforms have greatly contributed to

their military conquests". It was due to this generous policy of the second Caliph that the Christian *Qibtis* of Egypt, who were farmers, always sided with Muslim Arabs in preference to Roman Christians. The great Caliph was not contented with these reforms. He worked out beneficial schemes for the advancement of agriculture and constructed irrigation canals, wells and tanks in his vast dominions. He established a public welfare department which looked after these construction works and furthered various beneficial schemes. The famous historian Allama Maqrizi says that more than one lac and twenty thousand labourers were employed in such works throughout the year in Egypt alone. A number of canals were constructed in Khuzistan and Ahwaz during this period.

The short period of the Caliphate Raashidah is considered the golden epoch of Islamic rule in which Muslims made all-round progress. During the Omayyad Caliphate many evils of aristocracy and autocracy had crept into its ranks. The socialist and peoples' democracy of the Caliphate Raashidah had given place to imperialism and autocracy. The original tenants were dislodged from their lands and their properties were distributed among the privileged classes. The State revenues inspite of all the repressive measures adopted decreased considerably. Hazrat Omar bin Abdul Aziz tried to check this rot and reintroduced the old reforms and returned the properties to their rightful owners. He ordered his collectors not to charge any revenue for uncultivated and pasture lands. He constructed a large number

of irrigation wells and tanks in his vast empire, and the tenants again became rich and there was hardly anyone to receive the alms.

The period of the Abbasid Caliphate is particularly noted for the Muslim advancement in diverse branches of sciences and arts. Agriculture, too, received great impetus under the Abbasids. A net work of canals existed in Iraq which transformed that country into a veritable garden. The first great canal constructed by an uncle of the Caliph Mansur was called *Nahr Isa* (Isa canal) which, issuing from the Eupharates at Al-Anbar ran into the Tigris west of Baghdad. It was open to ships and one of its branches was the *Sarah* canal. Another important canal was built by Caliph Mehdi in Wasit district, which brought a large tract of land under cultivation. A third transverse canal was *Nahr Sarsar* which joined the river Tigris above Madain. The *Dujayal* canal which connected the Tigris and Eupharates and had many offshoots irrigated the regions north of Baghdad. It was silted up in the 10th century A.D. A canal known as *Nahr al-Malik* (king canal) entered the Tigris below Madain. Other important canals were *Nahr Kutba* and great *Sarah* which flowing in the lower basin of the two rivers, had many branches and irrigated a vast tract of land. Promotion of agriculture and horticulture was carried on with zeal throughout the vast Abbasid empire. According to an annalist, 'In those days Iraq and southern Persia presented the appearance of a veritable garden, and, the whole country specially between Baghdad and Kufa was covered with prosperous towns, flourishing villages

and fine villas. The staple crops of Iraq were barley, rice, wheat, dates, cotton, sesame and flax. The production of fruit was pursued as a science and several new fruits were introduced in varying climates. The plain south of Sawad was noted for the growth of all sorts of temperate and tropical fruits. Ahwaz and Fars were famous for sugar plantation and manufacture. The sugar manufactured in these regions was supplied not only to Asiatic countries but also to Europe. Sugar was also manufactured on the Syrian coast, from, whence the crusaders learned the method and introduced it into Europe. Khorasan and Egypt were also fertile countries yielding rich agricultural produce. According to the Arab geographer Yaqut the land in the vicinity of Bukhara during Samanids' rule (900 A.D.) looked like a garden. It contained the valley of Sughad considered as one of the four earthly paradises. All kinds of fruits were produced in these gardens. Water-melons were exported from Khwarizm to Baghdad, in lead moulds perched with ice and were sold for 700 dirhams each.

In Spain, Arabs had established a great civilization and had developed agriculture on an unprecedented scale. They had constructed water channels, applied scientific manures and introduced new crops. The whole of Spain especially Andalusia had been converted into a veritable garden. Hardly any country of mediaeval times enjoyed greater agricultural prosperity than Muslim Spain. Agriculture was carried on along scientific lines and combining industry, skill and knowledge in its development made the most sterile tracts bloom luxuriantly. It was the Spanish Arabs

who introduced rice, sugar-cane, cotton, ginger, saffron, spinach and a great variety of fruits to that desolate peninsula and developed them on a large scale. From Spain these crops were later gradually introduced into various countries of Europe. In 1255 A.C., when Feridnand I, captured Seville, that province possessed several million olive trees and had more than 100,000 mills for turning out olive oil. A renowned historian writes about the achievements of the Arabs in Spain, "They levelled the earth by means of an instrument called the *marhifal*, and the science of irrigation was carried to high perfection. The whole country was covered with aqueducts and canals for the fertilization of the soil. The aqueducts of Carmona carried water over a distance of several leagues".[1]

They carried on irrigation by flood gates, wheels and pumps. The Andalusian plain of Spain was considered the garden of Europe and a centre of rural and urban activities. Writing in his well-known book *History of the Arabs*, Philip K. Hitti says, "This agricultural development was one of the glories of Muslim Spain and one of the Arabs' lasting gifts to the land, for Spanish gardens have preserved to this day a 'Moorish' imprint. One of the best known gardens is the Generalife (from Arabic—*Jannet al-arif* i.e., the Inspectors' Paradise), a Nasrid monument of the late 13th century whose villa was one of the outlying buildings of the Alhambra. This garden, 'proverbial for its extensive shades, falling waters and soft breeze', (according to Ibn Khatib) was terraced in the form of an amphitheatre and irrigated by streams

[1]A Short History of Saracens, page 576.

which, after forming numerous cascades, lost themselves among the flowers, shrubs and trees represented today by a few gigantic cypresses and myrtles".[1]

The Indo-Pak sub-continent during the Muslim rule was one of the most fertile agricultural areas of the world. The prices of grain and other edible commodities during the reign of Alauddin Khilji and Shah Jahan quoted by chronicles of these times were exceptionally low and hardly believeable. The Jamuna Gangetic Doab was known throughout the world for its fertility and productivity. During the Mughal period a number of canals were taken out from Jamuna which irrigated the vast tracts of land round about Delhi and Agra. The villages were self-sufficient and the high agricultural productivity enhanced the prosperity of the people.

The Muslims took much interest in the advancement of horticulture, which was not confined to the cultivation of fruits and vegetables but also to the planting of all sorts of flowers. Damascus, Shiraz and Jur were particularly noted for their flower gardens, which led to the growth of perfume industry in these regions. Firozabad in Faris was famous for its *atar* of roses. According to Ibn Hauqal, the rose water of Jur was exported to such distant countries as China. 'Faris' according to Thaalibi, 'included in its *khiraj* 30,000 bottles of the essences of roses. Sabur or Shahpur produced 10 world famous varieties of perfumed oil.'

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[1]History of the Arabs, pages 528-29 and Ibn al-Khatib Lambah, page 109.

Muslims had a special aptitude for gardens. The garden of Generalife in Granada (Spain) and the Shalimar gardens built by the Mughal emperors Jahangir and Shah Jahan in Kashmir and Lahore respectively are considered to be the best in the world. "Natural products" says J. H. Kramers, "which, by their name, betray their original importation from Muhammadan countries, are fruits like the orange, lemon, and apricot, vegetables such as spinach and artichokes, further saffron and now the so important aniline".[1]

Arab botanists wrote several valuable treatises on plants and carried on research on their cultivation, growth and natural properties. One of these treatises was written by Ibn al-Awwam entitled *Kitab-al-Filaha* in which he dealt with 585 plants and 50 kinds of fruit trees. According to George Sarton, "It contains striking observations on the different kinds of soil and manure and their respective properties, on various methods of grafting on sympathies and antipathies between plants , etc. The symptoms of many diseases of trees and vines are indicated, as are also methods of cure".[2]

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[1]Legacy of Islam, page 104.

[2]An Introduction to the Study of Science, Vol. II, Part I, page 425.

EDUCATIONAL INSTITUTIONS

The call of the Holy Prophet of Islam to 'seek knowledge even unto the distant China' awakened a love of knowledge among the nomadic Arabs, such as was hitherto unknown to the world. Such memorable words uttered by the Holy Prophet as 'The ink of the scholar is more holy than the blood of the martyr' and 'He who leaves his home in search of knowledge walks into the path of God' had a salutary effect upon his followers and led to the growth of intense educational activity throughout the length and breadth of the vast Islamic domains. "Science and literature possessed no votaries" says Ameer Ali "But the words of the Prophet gave a new impulse to the awakened energies of the race. Even within his lifetime was formed the nucleus of an educational institution, which in after years grew into universities at Baghdad and Salerno, at Cairo and Cordova".[1]

After the downfall of the Roman Empire chaos and intellectual stagnation held sway over the civilised world. The masterpieces of Greek philosophy, science and art lay buried under the dark vaults of the monasteries and might have disappeared altogether from the world, but for the Arab revival and patronage of ancient learning. "The Arabs" says Humboldt "were admirably suited to act the part of mediators, and to influence the nations from the Eupharates to

[1]Spirit of Islam, Ch. IX.

Guadalquivir and Mid-Africa. Their unexampled intellectual activity marks a distinct epoch in the history of the world".[1]

The educational and intellectual activity during the lifetime of the Prophet was started by the house of the Prophet itself. Hazrat Ali, who was brought up and educated under the direct supervision of the Prophet, acquired a high reputation in Islamic learning. He lectured on those branches of learning most suited to the wants of the infant State. Hazrat Ali and his cousin Hazrat Abdullah ibn Abbas rose to be the greatest intellectual figures of their age. The latter delivered public lectures on poetry, grammar, history and mathematics.

System of Education

During the early decades of Islam mosques formed the nerve centre of political, religious and educational activities in Islam. Even during the present time, mosques house *maktabs* and important institutions of religious education throughout the Islamic countries. Special quarters were attached to the mosques and shrines for the residence of teachers, students and travellers. This provision continues even to this day in Syria, Persia and several other Muslim countries. *Madrassa* mosque was an innovation of Persia, whose big congregational mosques had separate portions assigned for the important institutions which imparted education in all branches of learning.

The child's education at home began with *Kalima* and the teaching of prayers and the Quran. The

[1]As quoted in Spirit of Islam, Ch. IX.

primary education was imparted in *maktabs* and mosques, which were confined to elementary religious and linguistic teaching. The girls were allowed in the lower grades of the schools, but not in the higher ones. Memory work was specially emphasised. The wealthy children employed private tutors. The celebrated Caliph Harun-ar-Rashid gave these instructions to the tutor of his son Ameen, which throws light on the system of aristocratic education in those times: "Be not strict to the extent of stifling his faculties or lenient to the point of making him enjoy idleness and accustom himself thereto. Straighten him as much as thou canst through kindness and gentleness, but fail not to resort to force and severity should he not respond".

Adult education was not as systematic as it is today. The curriculum revolved round religious education, which was the most important subject at this stage. The Muslim religion, as is well-known is not theocratic, rather it is dynamic and practical reflecting on diverse aspects of a robust practical life. Mosques served as educational centres and made provisions for lectures on Hadith and Quran. The wandering geographer Moqaddasi who visited the distant Sus and travelled through Syria, Palestine, Egypt and Faris found in those countries many circles and assemblies composed of *faqih*, legists, divines and litterateurs who had selected the mosques as the venue of their intellectual and educational activities. The Imam al-Shafii presided at such a circle (*halqa*) at the mosque of *Amar* at al-Fustat till his death in 820 A.D. Ibn Hauqal mentions similar assemblies in Sijistan. Not only religious but even linguistic, philosophical and literary subjects

were taught in such assemblies. Such lectures in mosques which continued upto the 11th century A.D. were free for all Muslims.

University education in the real sense of the word started in the 11th century A.D. with the opening of Nizamiyah universities of Neshapur and Baghdad. The universities taught almost all sciences and arts, but mostly relied on theoretical teaching. Inspite of lacking modern scientific laboratories, these Islamic universities produced such eminent scientists as modern India and Pakistan have not produced so far. The higher grade teachers were much respected and granted a recognised certificate (*Ijazat*) to their pupils who completed particular course of study.

There are several good points in Islamic education which have existed for the last thirteen centuries. Islamic education was free, hence provided equal opportunities to the rich and the poor to acquire the highest education available in the Islamic universities of the world. Not only that, but students were provided with free boarding, lodging and even with stationery, books and pocket expenses.

The modern age in spite of its enormous resources cannot boast of such an elaborate system of free education. A university education can only be attained now-a-days, by wealthy students. It was because education was free, that from the lowest strata of society have risen some of the brightest intellectual luminaries of the Islamic world like Al-Ghazali, Hazrat Abdul Qadir Jilani, Al-Beruni, Al-Razi and Al-Farabi. Memory was much emphasised in study and some of

the renowned Muslim scholars and teachers possessed amazing memories. In those days there were no diaries and memoranda and retentive faculties were developed to a phenominal degree. Al-Ghazali, Ahmad Bin Hanbal and the famous traditionalist Al-Bukhari memorised numberless traditions with their chain of authorities (*Isnad*). The celebrated poet Mutanabbi, Tamman and Al-Maarvi possessed wonderful memories and never found it necessary to buy a book.

The use of the rod by teachers was common in oriental as well as in western education during mediaeval times. The learned professors used to lecture on different subjects and the pupils used to sit round them and take notes of their lectures. This was the popular method of teaching in higher institutions. The professors and teachers were much respected by their students and also were held in great esteem in the highest society. Even the sons of the caliphs and emperors paid great respects to their teachers. Once Mamun-ar-Rashid was beaten by his teacher Yezidi. Jaafar Bermaki, the grand vizier of the Abbasid Empire chanced to arrive there at that time and took Mamun with him. The next day Yezidi asked Mamun, if he had complained about him to the Prime Minister. Thereupon Mamun replied like a humble pupil, "No my respected sir, how can I complain against my teacher. I would not even inform the Caliph Harun with such matters rather than Jaafar."

The teachers and learned professors in the great Islamic institutions were the incarnation of simple

living and high thinking. They led an exemplary life and bore high character. The students copied the pious lives of their teachers. Though memory was much stressed and the practical side of the sciences was neglected, yet the education imparted to the students was substantial and creative. It really added to their knowledge and stands in great contrast to the superficial education of modern times.

There were three kinds of institutions:—(1) Those established and supported by the ruling class, (2) those founded by the wealthy class and supported by donations and endowments and (3) those founded by private lecturers. The finances of the institutions specially of the higher ones were met by the State Exchequer, donations and endowments. The teachers, who were not highly paid, led a simple but respectable life. Their intellectual pursuits did not give them time to think about and participate in worldly pleasures. Donations poured into institutions which always kept their finances sound and had enough funds to make arrangements for the free education, lodging and boarding of a large number of students. In his treatise on pedagogy Zarnuji has recorded this saying of Hazrat Ali: "I am the slave of him who has taught me even one letter". Al-Zarnuji has written scores of Arabic treatises on education.

Educational Institutions in Hejaz

Mecca and Medina had been the most important intellectual and educational centres in the Islamic world before the establishment of the Abbasid Cali-

phate. The famous mosque of the Prophet at Medina was graced by the presence of such intellectual giants, legists and divines as Hazrat Ali, Hazrat Abbas, Hazrat Jaafar Sadiq, Imam Malik and Imam Hanbal. Even during the glories of the Abbasid Caliphate, the celebrated Harun-ar-Rashid had sent his sons Amin and Mamun to Medina to obtain education in religion, traditions and language. The children of Fatimah believed in the pursuit of learning and produced some of the most eminent scholars that Islam has known. From the four corners of the vast Islamic world students flocked round Imam Jaafar Sadiq and Imam Malik in Medina in order to be enlightened by their scholarly discourses.

Omayyads

The Omayyads paid little attention to the development of education and advancement of learning. They were mostly occupied with the suppression of internal conflicts, the consolidation of their great empire and the persecution of the great sons of Islam. The eminent Muslim scholars specially those belonging to the House of the Prophet preferred to lead a secluded life at Medina. During the Omayyad rule, Medina, Kufa and Damascus were the greatest centres of Islamic education, which was mostly given in mosques by the celebrated scholars. The short rule of Hazrat Omar Bin Abdul Aziz and the intellectual pursuits of Khalid Bin Yazid provided the only real educational activities during the Omayyad Caliphate.

Abbasids

The Abbasid Caliphate provided the most congenial atmosphere for the advancement of learning and education. In fact, the reign of Mamun-ar-Rashid who has deservedly been called the 'Augustus of Arabs' formed the culmination of the intellectual achievements of the Muslims. He was followed by a brilliant succession of Caliphs who continued his work.

The *Darul Hukama* (House of Wisdom) founded by Mamun in 830 A.D. at Baghdad was the first institution of higher learning in the Islamic world. Besides being a translation bureau, this institution functioned as an academy and housed an up-to-date library as well as an observatory. The academy and observatory run by the *Darul Hukama*, served as training and teaching centres in various branches of sciences. "The glory of Muslim education was its university system, which fed the higher learning. The academy of Mamun at Baghdad and the Hall of Wisdom of Fatimids at Cairo were great institutions and are explained by their environments".[1]

Mamun-ar-Rashid who was a great patron of learning and education founded important institutions in Baghdad, Basrah, Kufa and Bukhara. According to Maulana Shibli Nomani, Mamun had built a big college in Khorasan which employed eminent scholars summoned from all parts of the empire. The Caliph Mutawakkil, a nephew of Mamun kept up the traditions of his great uncle. In Egypt the Fatimid

[1]Encyclopaedia Britannica, Vol. 12, page 714, Edition 1947.

Caliph, Al-Hakim, had founded in 995 A.D. at Cairo an institution similar to the House of Wisdom of Mamun called the 'Hall of Wisdom or science', which contained a library, an observatory, and a medical college. It also had a big boarding house for students attached to it. Another Egyptian Caliph Aziz Billah constructed big institutions and dwellings for teachers and students who were also paid salaries.

Nizamiyah Institutions

Nizam-ul-Mulk Toosi, the talented Prime Minister of Malik Shah Saljuqi had the distinction of being one of the greatest patrons and sponsors of higher education in Islamic history and founded a chain of great institutions all over his vast dominions. The rise of the Saljuqis and their grand munificence towards scholarship and science rivalled that of the golden days of the Abbasid rule. The grand vazier Nizam-ul-Mulk Toosi had collected round him a galaxy of talented scholars. He had founded Nizamiyah types of higher institutions in Neshapur, Baghdad, Khorasan, Iraq and Syria. The first great institution was the Nizamiyah University of Neshapur founded by Nizam-ul-Mulk Toosi in 1066, which in fact, was the first University of the Islamic world. Imam-ul-Harmain, the teacher of Al-Ghazali was the principal of Neshapur University, while Ghazali was a student of this University. In a lecture hall in Neshapur University, there were 500 ink-stands. According to Allama Khalikan, Nizam-ul-Mulk Toosi was the first person in Islamic history to lay the foundation of a regular educational institution. The State Ex-

chequer was affected by the great munificence of Nizam-ul-Mulk toward the advancement of education. Malik Shah Saljuqi called his grand vazier Nizam-ul-Mulk and said "Dear Father—you can organise a big army with so much money. What great achievements do you expect from persons on whom you are showering your benevolence?" The wise minister replied, "My dear son, I have grown old, but you are a young Turk. If you are auctioned in the bazar, I doubt you will fetch more than 30 dinars. In spite of this God has made you the monarch of such a vast empire. Should you not be grateful to Him for the same? The arrows thrown by your archers will not fly far more than thirty yards, but even the vast shield of the sky cannot check the arrows of the prayers flung by the army which I have undertaken to produce". Malik Shah was struck with the wise reply of his talented vazier and cried out, "Excellent father—we must prepare such an army without the least delay". The example set by Nizam-ul-Mulk led to the opening of several high class institutions all over the Islamic world. The wealthier class of people and the members of the ruling class vied with each other in the building of educational institutions. During the sixth century A.H., there was hardly any corner of the Islamic world which did not contain such institutions. The big cities of Khorasan namely Merv, Neshapur, Herat and Balkh as well as Isfahan particularly benefitted from the patronage of Nizam-ul-Mulk and had a chain of Nizamiyah institutions of higher education. Yaqut Hamvi found a large number of institutions including Mustafia, Amidia, Khatunia and Nizamiyah besides

several big libraries in Merv, when he visited this city in the 6th century A.H. Nizam-ul-Mulk not only founded great institutions all over his territories, but staffed them with the best talents of the age which immensely enhanced their reputation. Among them was *Hujjat-ul-Islam* Al-Ghazali, Principal of Nizamiyah University of Baghdad, Imam-ul-Hurmain, Principal of Nizamiyah University of Neshapur, As-Shashi at Herat and Abu Ishaq Shirazi at Nizamiyah of Baghdad. Following the example of Nizam-ul-Mulk, another Saljuqi minister Tajuddaulah founded a college called 'Tajiyya' and other colleges too were opened at Samarqand, Balkh, Alleppo, Damascus and Ghazni.

Nizamiyah University of Baghdad

The greatest achievement of Nizam-ul-Mulk Toosi in the educational sphere was the establishment of the Nizamiyah University of Baghdad in 1065—67, A.D. which stands as a landmark in the educational advancement of Muslims during mediaeval times. Nizamiyah of Baghdad served as a model institution in the world of Islam, and its great reputation and high standard of teaching attracted students and scholars from all over the known world. The greatest scholars of their age deemed it a great honour to be appointed a professor at this world famous University. "The Saljuqs, like the Buwayhids and other non-Arab sultans", says Hitti, "who usurped the sovereign power in Islam, vied with each other in patronising the arts and higher education, perhaps as a means of ingratiating themselves with the population".[1] There is much truth

[1]History of the Arabs, page 410.

in the above statement. Nizamiyah was primarily a theological institution recognised by the State in which besides the teaching of philosophy, arts and sciences, the Quran and old poetry formed the backbone of the study of humanities. The lecturer was assisted by two or more repeaters, who repeated the lecture to the less gifted students, when the class was over. Ibn Jubair had once the occasion of attending the lecture of a learned professor in the afternoon. The students were sitting round him on stools and piled him with oral questions till the evening. Al-Ghazali, one of the greatest intellectuals of Islam had the distinction of being appointed the Principal of this University at an early age of 34, and occupied this post for four years (1091—95 A. D.). Nizamiyah survived the great calamity which had fallen on Baghdad in 1258 A. D. at the hands of Hulagu Khan the Mongol, and was at last merged with Mustansariya, two years after the conquest of Baghdad by Tamerlane in 1393 A. D. Nizam-ul-Mulk Toosi, who was a great patron of education had set apart 1/10th of his entire income to be spent on his educational enterprises. He spent about 3 million rupees on the building of institutions all over his territories and spent more than a million rupees on the building of Nizamiyah of Baghdad alone as well as granting a regular sum of a lac rupees per annum for its expenses. According to Gibbon, "Both rich and poor students had equal opportunities of receiving the highest education in this institution. The education was free and the entire expenses of the poor students were met by the University. The teachers were paid handsome salaries". Abu Ishaq

Shirazi was appointed the first principal of this University. The well-known Persian poet Saadi Shirazi had been its student. Among its eminent principals were Al-Ghazali, Imam Tabari, Ibn Al-Khatib, Tabrizi and Abul Hasan Fasihi and among its outstanding professors were Bahal-al-Din, Abul Maali, Kutubuddin Shafaii and Kiya Harasi. Hardly ever was there appointed a lecturer in this institution during the two hundred years of its existence who was not the master of his subject. The University housed a big library, whose librarian was Allama Abu Zakariya Tabrizi. According to Ibn Athir, the Abbasid Caliph Nasiruddin added another library to the University in 589 A. H., to which a large number of books were transferred from the Imperial Library. According to Maulana Shibli Nomani, Nizamiyah was the first institution in the Islamic world in which regular scholarships were awarded to students.

Mustansariya University

It was rather a blot on the Abbasid Caliph that the well-known Nizamiyah University of Baghdad was built by a non-Abbasid, hence Al-Mustansir Billah, the Abbasid Caliph made amends by opening the Mustansariya University at Baghdad in 1234 A. D. This was the greatest university ever founded in the Islamic world. It took six years to build this majestic university on the bank of the river Tigris. A grand opening ceremony of this great institution was held, and on this auspicious day one hundred camel loads of rare manuscripts were transferred to the University from the Imperial Library. The

building was stately and equipped with all the amenities available in those times. It contained a hospital, a big library, baths, kitchens, a water cooling plant and several spacious hostels for the residential students. The education in the University was free and the students were also provided with free boarding and lodging as well as a monthly scholarship of a gold sovereign each. Properties yielding an income of about half a million rupees per annum were given as endowment for the expenses of the University. Allama Zahbi has given details of the working of this institution in his well-known work *Tarikh Dawal-al-Islam* (History of Islam). The building had a clock (of clepsydra type) at an entrance, whose dial was blue like that of the sky and a sun which constantly revolved across its surface, denoted the time. This clock was made by Ali Bin Saghlab Balbaki, the celebrated astronomer of his time. The Caliph had built the University as a seminary for the four orthodox rites, and all the four law schools were represented in it. A detailed description of the University building is available in the memoirs of Ibn Batuta who visited it in 1327 A. D. The ruins of the famous University are still visible and part of it has been taken over by the department of antiquities.

Ayyubid Institutions

The patronage of learning and the deep interest taken by Nuruddin Mahmud Zangi and Sultan Salahuddin in public welfare activities, specially the advancement of education, once more reminded people of the days of Mamun-ar-Rashid and Nizam-ul-Mulk

Toosi. Nuruddin founded big institutions in Alleppo, Halab, Hams and Balbak. He built a great college in Damascus, his Capital city. Nuruddin had the distinction of establishing the first *Darul Hadith* (House of Traditions). Allama Ibn Jubair, who visited Damascus in 578 A. H., found 20 big colleges there. It was proclaimed, whoever would build an institution, the entire expenditure would be met by the Imperial purse. A big piece of property including seven gardens, whose annual income was five hundred gold pieces was set aside for meeting the expenses of western students. Five hundred students were paid honorarium from the Imperial Treasury. Nuruddin himself, from his private property created a trust for institutions, whose annual income was more than nine thousand gold pieces.

Sultan Salahuddin, better known as Saladin in the west was also a great patron of learning and education. He had founded big educational institutions in Alexandria, Cairo, Jerusalum and Damascus. According to Allama Ibn Jubair, "any student who resided in the hostels of Alexandria was paid his full expenses". In his State, teachers salaries paid out of the Imperial Treasury amounted to 1½ million per annum. The patronage of education by Saladin, awakened a lively interest for learning among the general populace and it was considered a sort of humiliation that a rich person should die without leaving behind any institution. Malik al-Zahir, the gifted son of Saladin kept up the traditions of his

father and founded two schools called *Shafia* and *Darul Hadith* (House of Traditions) in Alleppo, which made this city a centre of learning.

Education in Spain

Spain, during the regime of the Moorish caliphs, developed education to a high degree of perfection. According to Maulana Shibli Nomani education in Sapin both primary and higher (secondary) was mostly given in mosques. Al-Hakam, the celebrated Spanish monarch, himself a great scholar was a great patron of learning and granted munificent bounties to the scholars. He opened 27 free schools in Cordova and took a keen interest in the progress of Cordova University which was founded by Abdur Rahman III in the principal mosque of the city. Under his patronage this institution rose to be one of the greatest universities of the world. According to Ibid, Cordova University, "preceded both Al-Azhar of Cairo and Nizamiyah of Baghdad and attracted students, Christians and Muslims, not only from Spain but from other parts of Europe, Africa and Asia. Al-Hakam enlarged the mosque which housed the University, conducted water into its lead pipes and decorated it with mosaics brought by Byzantine artists spending on it 2,61,537 dinars". The famous historian Ibn Khalikan writes that Al-Hakam invited learned professors from all parts of the Muslim world who were paid handsome salaries. Among its professors was the historian Ibn al-Qutiyah.

The imperial patronage of education, raised the standard of learning and literacy to a high level in

Spain. The eminent Dutch scholar Dozy has declared that "Nearly every one could read and write". "All this" says Philip K. Hitti, "whilst in Christian Europe only the rudiment of learning were known and that by the few, mostly clergy."[1] Writing in *The Moors in Spain* Stanely Lane Poole observes about Cordova, "Beautiful as were the palaces and gardens of Cordova, her claims to administration in higher matters were no less strong. The mind was as lovely as the body. Her professors and teachers made her the centre of European culture; students would come from all parts of Europe to study under the famous doctors, and even the nun Horswitha far away in her Saxon convent of Gaudersheim, when she was told of the martyrdom of St. Eulogius, could not refrain from singing the praise of Cordova, 'The brightest splendour of the World'. Every branch of science was seriously studied there and medicine received more and greater additions by the discoveries of the doctors and surgeons of Andalusia than it had gained during all the centuries that had elapsed since the days of Galen. Astronomy, geography, chemistry and natural history were all studied with ardour at Cordova".[2]

The subjects of higher education in universities and colleges were theology, philosophy, language and literature, lexicography, history, geography and sciences. Several principal cities of Spain including Cordova, Granada, Seville and Malaga possessed universities, colleges and institutions of higher educa-

[1]History of the Arabs, page 531.

[2]The Moors in Spain, page 144.

tion whose enrolment ran into thousands. The university of Cordova taught among other subjects jurisprudence, astronomy, philosophy, mathematics and medical science. The certificates and degrees granted by this university were much valued throughout Muslim countries especially in Spain.

The seventh Nasrid monarch, Yusuf Abdul Hajjaj (1333—54 A.D.) had founded the university of Granada, which became an important centre of Arabic studies in the Spain of those times. The university possessed a stately building whose portals were guarded by stone lions. Besides other subjects, jurisprudence, sciences, theology, medicine, astronomy and philosophy were studied in the university. Castilian and other Christian students studied in this university. The university organised public meetings, literary discussions and lectures delivered by the professors. An inscription on the portals of the university building ran as follows:—

"The world is supported by four things only: the learning of the wise, the justice of the great, the prayers of the righteous and the valour of the brave."

A spirit of cordiality and brotherhood prevailed among the students of various nations and religions who had thronged to the institutions of Muslim Spain. According to Renan, "The taste for science and literature had, by the 10th century A. D., established in this privileged corner of the world, a toleration of which modern times hardly offer us an example. Christians, Jews and Musalmans spoke the same tongue, sang the same songs, participated in the same

literary and scientific studies. All the barriers which separated the various peoples were effaced; all worked with an accord in the work of a common civilization. The mosques of Cordova, where the students could be counted by thousands, became the active centres of philosophical and scientific studies".[1]

Al-Azhar, Cairo

Al-Azhar, the famous university of Cairo, which has already completed more than a thousand years' of its existence is at present the oldest and the second greatest university in the world. For centuries in the past and even during the present times, it has the reputation of being the biggest and the most important university of the Islamic world, with an enrolment of more than ten thousand students. The Al-Azhar mosque was built by Djawher al-Khatib al-Sikilli, a year after the occupation of Egypt by Fatimids. It was opened for service in July 972 A. D. Several Fatimid rulers made additions to it. Al-Aziz Billah (976—996 A.D.) added to it an academy, where higher education was imparted. Al-Hakim (996—1020 A.D.) made further additions to the building for teaching purposes as well as made endowments to meet its running expenses. Makrizi II gives an account of the adoption of Al-Azhar's name, which, according to him is derived from Al-Zahra, the origin of Fatimids.

During the Ayyubid regime certain changes and additions were made in the status of the institution.

[1]Renan—Averroes et Averroism, page 4.
[2]As quoted in Ameer Ali, The Spirit of Islam, page 379.

But it was Malik Al-Zahir Baibars who is credited with making Al-Azhar, a great seat of learning in the east. He made extensive additions to the building. The last great Mamluk ruler Kansuh al-Ghori (1500—1516 A. D.) built the two towered minarets. The later Khadivs also did much to maintain the high reputation of this university. The poor students received all sorts of financial help from the endowments and the State exchequer. The Mongol devastations had effaced all seats of learning and culture from Baghdad, Persia and Turkistan hence students flocked from all parts of the Muslim world to Al-Azhar, which was the only great Muslim institution left in the world. The university encouraged its students to earn a part of their expenses from other sources and carried on vocational training programmes.

Turkish Institutions

The Ottoman caliphs did not lag behind their predecessors in their efforts for the advancement of education in their territories. As the world had advanced, the Turkish educational institutions were superior to the old Islamic institutions and were more akin to the modern ones. All such educational institutions were controlled by the State, hence had better management. The system of Turkish education was rather more political and practical and aimed at producing good citizens and able servants of the State. The institutions were controlled by some university or Board of Education. The teachers were handsomely paid and the Turks were the first to grant pension to their teachers. Sultan Muhammad II

was a great patron of education. During his regime every village had a school and in higher institutions as many as ten subjects including grammar, logic, language, literature, journalism, mathematics, astronomy and other sciences were taught. The students who passed out of these higher institutions were called *Danishmand* (learned).

Ar Khan was the first Turkish ruler who founded many schools. Muhammed the conqueror, established a big university in Constantinople in 865 A. H. which controlled eight big colleges having separate hostels attached to them. Sultan Bayazid who ascended the throne in 886 A. H. founded many big educational institutions. Sulaiman the magnificent, the greatest emperor in Turkish history, who was crowned in 982 A. H. besides building dozens of institutions all over his empire, founded four big educational institutions in Mecca. He awarded scholarships to 600 students.

Other Institutions

The patronage of educational institutions by Nizam-ul-Mulk Toosi, created a lasting interest for such institutions among the general populace. Founding of a *Madrassa* began to be considered a meritorious act. Ibn Jubair who visited Baghdad in 578 A. H. had counted 30 big colleges in Baghdad, 20 in Damascus, 6 in Mosul and one in Hams. These institutions possessed stately buildings.

Neshapur was only second to Baghdad as the educational centre in the Islamic world. When, in

556 A. H. it was destroyed by internal rebellion, 25 big institutions were also razed to the ground. Amir Nasr, brother of Sultan Mahmud, had built an institution called Sayidia. The inhabitants of Neshapur had invited professor Abu Bakr Khurakh. When he arrived, a big institution was raised for him out of the public subscription, which was the first of its kind in Islamic history.

The famous conqueror Mahmud Ghaznavi was a great patron of learning. His literary circles were attended by two of the greatest intellectual luminaries of their age—Beruni and Firdausi. He built a grand institution at Ghazni in 410 A. H., which also housed a big library. He set aside a big landed property to meet its running expenses. The Amirs of his court followed the example set by the Sultan and according to Frishta within a short time scores of educational institutions sprang up in Ghazni. Allama Husain Bin Ahmad Abul Fazl who died in 591 A. H. controlled 12 educational institutions in Yezd in which more than 15 hundred students were enrolled. The celebrated Imam Fakhruddin Razi who died in 606 A. H., was a professor in the principal college of Khwarizm. A French traveller visited more than 48 educational institutions in Isfahan during the Safawid rule.

Abdul Basit founded three good institutions in Mecca. Malik Ashraf, a member of Chraska dynasty, who ascended the throne in 772 A. H., built a big college in Mecca, which had 72 rooms and a big hall in the centre whose roof was made of marble stone painted with gold.

Ibn al-Nasir Muhammad Ibn Kalaon built a grand college in Cairo, for whose construction he spent more than 20 thousand dirhams daily amounting to about 5¼ million rupees in total.

The noted colleges of Syria were Al-Rishiyya, Amania, Tarkhania, Khatunia and Safria. In Egypt during the Ayyubid rule, the colleges of Rambiyya, Nasariyya and Sulahiyya were founded.

Military Academy of Morocco

Abdul Momin, Sultan of Morocco, founded the first military academy in the world, details of which are given in the history of the dominion of Spain written by Kandi. The academy taught military science besides other sciences and arts. The Sultan was extremely interested in the running of the institution. He wanted this academy to produce good generals and administrators as well as scholars. It had three thousand students of the same age, whose daily lessons, physical exercises and military drill were attended by the Sultan himself. Archery exercises were held on alternate days, while swimming and naval warfare were taught to the trainees in a big tank once a week. The outstanding students were handsomely rewarded by the Sultan, who met the entire expenditure of the academy.

The Ottoman Turks paid great attention to the development of military science and built one of the finest military colleges of its time in Constantinople (Istanbul).

Medical School

Medical science was taught as a subject in several Islamic universities including Mustansariya, Cordova and Al-Azhar. Imam Zakariya Razi, the eminent physician of Islam taught medical science in his *Bimaristan*, an institution in which he dealt with both the practical and theoretical sides of the science. According to Gibbon, the first school of surgery in Europe was founded in Salerno, a city in Muslim Sicily.

The *Haj* or Annual pilgrimage to Mecca has also been of much educative value and people learnt a great deal from the learned scholars who resided in Mecca.

Thus Muslims were the torch-bearers of civilization, learning and education during mediaeval times and procured the necessary link between the ancient and the modern civilizations. "The oldest Christian Universities of Bologna, Paris, Montpellier and Oxford came into being in the 12th century", writes *Legacy of Islam.* "The first 'Arabian' University in Europe owed its origin to Muslim learning".

LIBRARIES

The human tendency of preserving the records of their achievements in various fields of life is very primitive and dates back to the beginning of civilization. Before the invention of paper, such records were laid down on stone slabs, clay tablets, parchments, leather and pieces of wood. The temples and State archives of Assyria and Babylon contained clay tablet libraries. The first library in Greece owes its existence to Pesistratus, who established it in Athens in 600 B. C. The largest library, before the advent of Islam was founded by Ptolemy in 287—84 B. C. at Alexandria, which is alleged to contain about a quarter of million books.

The birth of Islam provided great impetus to human pursuits of knowledge. The necessity of preserving the Quran and the Traditions (*Hadith*) awakened the spirit of collecting such writings in various forms, which paved the way for the establishment of the earliest libraries in the world of Islam. The mosques which, during the early decades of Islam formed the nerve centres of all political, religious and educational activities, housed valuable libraries comprising books on religion, philosophy and science. Soon, however, Muslims who distinguished themselves as the greatest patrons of learning, established during the days of their glory some of the biggest libraries of mediaeval times. The great intellectuals of their

age including Avicenna the encyclopaedist, Ibn Miskawayh the historian-philosopher, Al-Fadl-Ibn Naubakht and Humayun Ibn Ishaq the renowned translator were entrusted with the responsibility for the organisation and maintenance of libraries. The Caliphate Raashidah and that of the Omayyads were the periods of conquests, consolidation and organisation.

Omayyads

Khalid bin Yazid, a learned scientist of the Omayyad dynasty is credited with being the originator of libraries in Islam. But historical opinions differ on the point. The celebrated Tunisian Historian, Ibn-Khaldun categorically denies the existence of any library during the time of Khalid bin Yazid, while Ibn Nadim in his well-known *Fihrist* ascribes the opening of the first library of Islam to Khalid. Hazrat Omar bin Abdul Aziz, the pious Omayyad Caliph had made available to the public the Royal library which he had inherited from his ancestors. This clearly shows that the foundation of the library was laid long before his time, probably by the learned Khalid bin Yazid. Thus during the Omayyad Caliphate the literary treasures were properly arranged, catalogued and preserved in a systematic way. Hisham Bin Abdul Malik collected a large number of rare manuscripts on various subjects including an illustrated copy of the ancient history of Persia. A large number of books on theology had been collected by Shahab-al-Zuhri, a well-known traditionalist of his age. Besides the above, Abu Qullabah, Abu Umrao bin al-Alla and Kreb bin Muslim had private libraries.

Abbasids

Under Mamun, the Muslims formed the vanguard of civilization. During the time of the early Abbasid caliphs, every part of the globe was ransacked by the agents of the caliphs for the hoarded wealth of antiquity. Mansur was the first Abbasid caliph who took an active interest in the pursuits and propagation of learning. He founded a translation department in which classical and scientific works were translated from various languages into Arabic. The philosophical, mathematical and scientific works of Greek masters, which otherwise would have remained buried in the dark recess of the Greek Imperial Palaces, were brought within reach of the common man by translating them into Arabic. According to the celebrated Urdu historian Maulana Shibli Nomani, the *Darul Hukama* (House of Wisdom) founded by Harun-ar-Rashid which was divided into two sections—one was concerned with the translation work and the other related to the collection of books and housed a big library.[1] Yahya Barmeki, the famous grand vazier of Harun had summoned well-known scholars from ditsant lands, who adorned the literary gatherings of the great Caliph. Harun-ar-Rashid who had founded a big library at Baghdad had appointed Al-Fadl Ibn Naubakht, a renowned scholar and translator, as head of his library. The library contained a large number of books, which were efficiently arranged and catalogued. Harun had a good taste for books and even carried large number of books on his military and other expeditions. Once,

[1]Al-Mamun by Shibli Nomani.

when he had gone to Riqqah, he took eight boxes of books with him. His pleasure resort built on the bank of the *Qatul* canal, had a library containing about 1,000 books. The reign of Mamun-ar-Rashid, known as the Augustus of the Arabs, formed the most glorious period in the field of intellectual achievements of the Muslims. He was the moving spirit behind the House of Wisdom, which employed the best brains of the age and acquired astounding success is a short span of 20 years. The library attached to the House of Wisdom was immensely enlarged and was managed by Sahl bin Harun and Saeed bin Harun, the Persians. A large collection of books of the pre-Islamic era were added to the library. The well-known book binder Ibn Abi-ul-Huraish was employed in the library for binding work. Humayun Ibn Ishaq, the chief of the translation department was also made the librarian of this famous library. Among the rare manuscripts preserved in the library were a document written on parchment by Abdul Mutallib bin Hashim (grand-father of the Prophet) and a few writings of Hazrat Ali and Imam Hasan. The interest taken by the Caliph in the accumulation of literary treasures created a taste for books not only in his associates but also among the common man. A number of ministers, officials and wealthy people established big libraries by spending large sums. Yahya Barmeki, grand vazier of Harun, owned a big library which contained a large collection of Persian and Greek manuscripts. Three copies of each book were kept in his library, which after the downfall of Barmekids were added to the Imperial

library of Mamun. Fateh bin Khakan, the vazier of Mutawakkil Billah founded a grand library which contained rare books on astronomy. Muhammad bin Abdul Malik Ziyat, Prime Minister of Caliph Wasiq Billah established a private library on which he spent ten thousand rupees. A big library was owned by Allama al-Waqidi, which was alleged to have contained 600 camel loads of books mainly on historical subjects. The libraries gained so much popularity that by the close of the 11th century A. D. there existed a network of libraries throughout the vast Abbasid Empire, and before the Mongol invasion, Baghdad alone had 36 big libraries.

Public Library

The first public library in Baghdad was opened by Sabur bin Ardeshair, the Prime Minister of the Buwayhid monarch Bahal al-Daulah. This was attached to the academy built by him in Baghdad in 991 A.D. Before the establishment of this library, all libraries were privately owned, and not open to the common man. This library of Sabur contained more than ten thousand books. This led to the opening of private libraries in the big cities of the Muslim countries including Baghdad, Cairo, Merv, Mosul and Tripolis. The big colleges and universities of Baghdad, Neshapur, Merv, Cairo, Damascus, Isfahan and Ghazni including the world famous Nizamiyah and Mustansariya of Baghdad housed splendid libraries. The principal mosques of the big cities of the world of Islam, which served as teaching institutions, also had sections of libraries attached to them.

Egypt

The Rise of Cairo under al-Muiz-li-dinillah added a spirit of rivalry in the patronage of learning between the caliphs of the Houses of Abbas and Fatimah. Al-Muiz has been acclaimed as the Mamun of the west and the Maecenas of Muslim Africa. The Fatimid caliphs Aziz and Hakim Billah were also great patrons of learning. Aziz has the distinction of adding an academy of higher education to the famous Al-Azhar mosque which housed a big library containing valuable books on Muslim theology, jurisprudence and philosophy. Caliph Aziz is also credited with founding an imperial library, one of the biggest libraries ever opened in the world of Islam. Allama Maqrizi has given its details in his well-known work *Kitab Al-Khatat-wal-Aasar*. This library was housed in a part of the Imperial palace and comprised forty chambers. There has been difference of opinion among writers about the total number of books possessed by this library. According to the estimate of Ibn al-Tanvir it had 200,000 volumes, according to Ibn Ali Wasli it had 160,000 and according to Ibn Abi Tai it contained 600,000 volumes. This famous library contained 18,000 books on ancient philosophy and 24,000 copies of Holy Quran. Once there was a reference of *Kitabul Ain* in the durbar of the Caliph Aziz, which was sent for from the library and the librarian presented 30 different copies of the required book. One of these copies was written in the hand of Khalil bin Ahmad Basri the author of the book. This library possessed a globe made by Ptolemy which was 2,250 years old and another globe made by Abul

Hasan Sufi for Azud-al-Daulah which was purchased for 15 thousand rupees. Among the rare manuscripts were specimens of the artistic writings of the renowned calligraphist Ibn Muqlah and an autographed copy of the history of Tabari. The Fatimid Caliph Al-Hakim laid the foundation of *Darul Ilum* on the lines of *Darul Hukama* (House of Wisdom) of Mamun. It was rather a rival institution and was equipped with a splendid library on whose upkeep large sums were spent by its patron. Great scholars and scientists were attached to the library, which was open to the public. Students were encouraged in research work and special apartments were reserved for the purpose. They were supplied with stationery free of cost.

Spain

The Omayyad Caliphate of Spain attained a standard of civilization which was only rivalled by the Abbasids in the East. Their intellectual achievements reached its zenith in the reign of Al-Hakam, who himself being a renowned scholar patronised learning and granted munificent bounties to the scholars. He founded a library of first magnitude in his capital Cordova. According to Philip K. Hitti, "Al-Hakam was a bibliophile; his agents ransacked the book-shops of Alexandria, Damascus and Baghdad with a view to buying or copying manuscripts. The books thus gathered are said to have numbered 400,000, their titles filling a catalogue of 44 volumes, in each one of which 20 sheets were

devoted to poetical works alone".[1] Al-Hakam, himself being an outstanding scholar, personally used a large number of these books and wrote marginal notes on most of the manuscripts which made them very valuable to later scholars. The celebrated Caliph paid extraordinary prices for the rare manuscripts and according to Ibn Khaldun he purchased the first copy of *Aghani*, written by al-Isfahani for a thousand dinars (four thousand rupees). According to Ibn al-Aabar, the poetical works of the library were catalogued in 880 pages. There were employed more than 5,000 calligraphists in the Royal library for copying the manuscripts. The books were most systematically arranged in the library. There were more than seventy libraries and one thousand institutions of higher education in Andalusia alone. Besides the Imperial and academic libraries there were libraries owned by scholars and nobles. It had become fashionable to own a library and the celebrated historian al-Maqqari has related a humorous story from Allama Hizri who was in search of a book. He found the book at a shop, but he could not purchase it as the price offered by another bidder was exhorbitant and was much above the actual price. The Allama questioned the rival bidder if he was much interested in the book. The reply given will sound strange these days. He said that he was not literate, but he wanted to buy the book for his library which he had established.

[1]History of the Arabs, page 531.

Morocco

In the beginning of the 17th century A.D. Sharif Zaidan, Sultan of Morocco, who had to leave his capital, sent his library on a ship which was not delivered at the proper place, and on its way to Marseilles, fell into the hands of Spanish pirates. The booty comprising about four thousand volumes were placed by the order of Philip III, the Spanish Monarch, in the Escurial library which made this library the richest in Arabic manuscripts in the West.

Persia and Turkistan

The love for preserving and arranging books in the form of libraries had become universal in the vast Islamic domains. The possession of a good library was taken to be a great honour in those days.

Abu Nasr Sahl bin Murzaban had spent his entire wealth on his library and had undertaken several trips to Baghdad to purchase books. One of the best libraries of the period was one owned by Muhammad bin Husain of Baghdad. Allama Ibn Nadim Baghdadi pays high tribute to the taste of its founder. The library contained a copy of the Quran written by Khalid bin Ali Alhayaj, a companion of Hazrat Ali, besides the letters written by the Prophet and his family members. Aziz-al-Daulah (977—82 A.D.) a great monarch of Iran founded a splendid library named *Khazinat-al-Kutub* at Shiraz in which he endeavoured to place all books written since the birth of Islam till his own time. The library was specially known for

its fine building and artistic equipments. There were 360 rooms in the building and each subject was allotted a separate room with its own catalogue. The books were neatly arranged in almarahs and the library employed a large supervisory staff. Another magnificent library known as the Home of Books was founded by Minister Fazl bin Amir at Rayy, near modern Teheran. It was supervised by the famous writer Ibn Miskawayh. It contained 400 camel loads of books listed in a 10 volume catalogue and was frequently visited by the celebrated geographer Ibn Yaqut, who received great help from this library in compiling his world famous geographical encyclopaedia. According to Yaqut, Merv had ten big public libraries, one of which called *Azizia* had more than 12,000 books. Books were liberally issued to the readers and once Yaqut himself got 200 books issued in his name.

"Mosques also functioned as repositories for books", says Philip K. Hitti, "Through gifts and bequests mosque libraries became specially rich in religious literature".[1] The famous historian "al-Khatib al-Baghdadi (1002—71A.D.) had willed his books as a *waqf* for Muslims, but those were placed in his friends' home. Al-Mausil, before the middle of the 10th century had a library built by citizens in which paper was supplied to the student, who wanted to take notes from the books.

The Samanid King of Bukhara, Nuh bin Mansur owned a magnificent library, which according to Ibn

[1]History of the Arabs, page 413.

Khalikan possessed rare books on almost all subjects specially on philosophy. Ibn Sina (Avicenna), the renowned intellectual luminary of Islam was given access to this library as he had cured the king of a fatal disease. Later on, Avicenna was appointed its librarian and he was much indebted to this library for his encyclopaedic knowledge. The library was housed in a big building in which a room was allotted to each subject. The books were systematically arranged in boxes and shelves.

Iraq

Saif-al-Daulah of Alleppo, the Hamadanid ruler had equal hold over the sword and the pen. He was a great patron of learning and had collected round him such intellectual giants as Abu Nasr Farabi, al-Isfahani and Al-Mutanabbi. He ruled from 944 to 967 A.D. and founded a splendid library containing rare books on literature. The famous poet Muhammad bin Hashim and his brother were in charge of his library.

The great library of Tripolis (Syria) contained more than three million volumes, including 50,000 copies of the Holy Quran.

A number of special libraries had sprung up dealing with particular subjects. Cairo has the distinction of establishing the first hospital library containing a large number of books on medicine, which was attached to the hospital founded by Ibn Tulun. The *Bimaristan*, founded by the celebrated physician Zakariya

Razi had a good medical library attached to it. The travelling dispensaries were equipped with up-to-date books on medicine, which could be compared to present day mobile libraries.

According to Nasir-ud-din Toosi, Hulagu Khan established a big library at Maragha with the books looted from Islamic countries. The library contained more than 400,000 books.

Decay

There were several causes for the decay of libraries in the world of Islam. With the downfall of the Abbasids, their vast empire was divided into small principalities, who for sometime kept up the tradition of their great predecessors. But their resources were limited. The greatest threat presented to the intellectual life of the Islamic world was the destruction wrought by the Mongol hordes. Changiz Khan, better known as the "Scourge of God" effaced all traces of Muslim civilization in Turkistan, Iran, Afghanistan and Asia Minor. He burnt remorselessly all the intellectual treasures of Bukhara, Merv, Isfahan, Shiraz, Ghazni and Rayy accumulated through centuries by the Muslims. The greatest single blow to Islamic civilization was struck by Hulagu Khan the Mongol, who destroyed Baghdad in 1258 A.D., and reduced to ashes the greatest literary treasures found in the Islamic world. It is said that millions of books were thrown in the River Tigris and its water turned dark.

The Muslim civilization had attained such a high standard that it served as a beacon light to the West.

The Christian conquerors of Spain tried to efface all traces of Arab civilization from their sacred land. In 1499 all literary treasures of the Muslims were collected from different libraries of Spain and burned by Cardinal Ximens, Archbishop of Toledo. Writing in the *Spirit of Islam*, Ameer Ali says, that in Spain, "Christianity destroyed the intellectual life of the people. The Muslims had turned Spain into a garden; the Christians converted it into a desert. The Muslims had covered the land with colleges and schools; the Christians tranformed them into churches for the worship of saints and images. The literary and scientific treasures amassed by the Muslim sovereigns were consigned to the flames".

It has been propagated by western historians that the Arabs destroyed the famous Alexandrian library. The latest historical researches have established beyond doubt that the said library was destroyed by the Romans themselves long before the advent of Islam. Writing in the *Glimpses of World History*, Pt. Jawahar Lal Nehru says: "There is a story that the Arabs burnt the famous library of Alexandria, but this is now believed to be false. The Arabs were too fond of books to behave in this barbarious manner. It is probable, however, that Emperor Theodosius of Constantinople was guilty of this destruction or part of it. A part of the library had been destroyed long before, during a siege at the time of Julius Caesar. Theodosius did not approve of the old pagan Greek books dealing with the Greek mythologies and philosophies.

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[1]Spirit of Islam, page 369.

He was too devout a Christian. It is said that he used books as fuel with which to heat his bath".[1]

On the contrary, it was the Christian crusaders who burnt the great Muslim library of Tripolis (Syria) containing more than three million books.

[1]Glimpses of the World History by Pt. J. L. Nehru.

MUSIC

Muslims have the distinction of being the pioneers in the sphere of fine arts in the world. They have patronised and actively participated in the propagation of fine arts wherever they have gone. A wrong impression has been created in the minds of our educated class by the orthodox type of people that Islam forbids all pursuits of fine arts by the Faithful—an idea which does not stand the test of historical records. The Muslims whether Spaniards or Arabs, Persians or Afghans, Turks or Indians have exhibited a lively interest in the development of fine arts which ultimately led to produce in their ranks some of the greatest exponents of these arts.

Arabian

According to H. G. Farmer, the celebrated writer on oriental music, "music accompanied the Arabs from the cradle to the grave, from the lullaby to the elegy. Every moment of his life seems to have had its particular music—joy and sorrow, work and play, battle throng and religious exercise".[1] Arabs were the great exponents of music and according to another western critic, "The cultivation of music by Arabs in all branches reduces to insignificance the recognition of this art in the history of any other country."

[1]Legacy of Islam, page 358.

Under the Abbasid, Spanish and Saljuqid kings music was elevated to the rank of a science., its cultivation was officially patronised and it was recognised as a fine art. People had developed a taste for music and according to Ameer Ali, "A large literature grew up on the subject; songs were collected and classified according to their melodies and keys, and the musical instruments of the ancients were improved and new ones invented."[1]

The first known Arab author on music is Yunus Al-Katib (d/765 A.D.) who was followed by Al-Khalil (d/791 A.D.) who has the unique distinction of being the "Systematiser of Arab Prosody and the first Arabian lexicographer". His theories were borrowed by Ibn Firnas who popularised them in Spain. Some of the earliest contribtutions of Arab Muslims on music were *Al-Iqd-al-Farid* and *Kitab-al-Aghani* written about 1,000 years before. During the 10th century A.D. music was included in the course of mathematics and was studied as such by the mathematical student. The celebrated Arab writers on music are Al-Kindi, Thabit bin Qurra, Sarakhsi, Ziryab, Al-Khwarizmi and Ibn Firnas. The most outstanding Muslim theorists on music are Farabi, Ibn Sina, Toosi, Ishaq Mausili, Isfahani, Razi and Shirazi who were actually Persian nationals but adopted the Arabic language as the medium of their expression.

Al-Kindi (d/260 A.H.) is one of the greatest Arab theorists, who has written about a dozen treatises on music. "In one of which" says G. Sarton, "we find the

[1]Spirit of Islam, page 358.

first definite use of notation among Arabs. He is the earliest Arab writer on music whose work has come down to us".[1] His works contain a notation for the determination of pitch. Out of his seven treatises on music three have been preserved upto the present time, namely: *The essentials of knowledge in music*, *On the melodies*, *The necessary book in the composition of melodies*. Ahmad Ibn Muhammad Al-Sarakhsi (d/286 A.H.) and Mansur Ibn Talha bin Tahir who were disciples of Al-Kindi wrote a number of books on the composition of Melodies. The former has the distinction of writing at least half a dozen books on the subject. Thabit Bin Qurra, (d/288 A.D.), the famous mathematician, enriched Arabic music with his valuable contributions.

Ibn Abd Rabihi (d/940 A.D.) was a great exponent of music who championed the cause of music in his famous work *The unique necklace* which contains the biographies of prominent musicians as well as "a spirited defence of music against the puritans".

Al-Buzjani (d/998 A.D.), one of the greatest Arab mathematicians composed a *compendium on the sciences ef rhythm*. Ikhwan-al-safa (10th century A.D.), well-known writers association of the era, wrote a treatise on music which was widely read and appreciated.

Al-Khwarizmi, the greatest mathematician of the Islamic world is the author of the *Key of sciences*

[1]An Introduction to the History of Science, Vol. I, page 559.

in which he discussed the theory of music. His views on music which were conveyed to Europe through the translation of the work by Adelard of Bath in the 12th century A.D. was according to Philip K. Hitti "one of the first to introduce Arab music into the Latin world".[1] Alam Al-Din Qaisar (d/ 1251 A.D.) an eminent mathematician of Egypt has earned a distinguished place among Arab Theories on music due to his valuable contributions.

Spanish

The Arabs of Spain did not lag behind other Arab countries in the pursuit of fine arts and produced a number of outstanding theoretical as well as practical musicians.

Ziryab was patronised by Abdur Rahman II and he has the distinction of running a model musical academy at Cordova which according to a western writer "became the conservatory of Andalusian music". He was an outstanding musician of his time who had migrated from Baghdad to Spain. Both in theoretical and practical music he has earned a very high reputation. He was the head of a family of talented musicians.

Ibn Firnas, the eminent musician who introduced oriental music into Spain, was the first who taught the science of music in Andalusia. He popularised the theories of Al-Khalil in Spain.

Ibn Bajja or Avempace (d/1138 A.D.). He is known as the Farabi of the West. He was an out-

[1]History of Arabs, page 600.

standing musical theorist whose musical theories received the same reception in the West as those of Farabi in the East.

Seville became a great centre of music in the 11th century A.D. and developed into a big market, for manufactured musical instruments. Europe learnt Arabic music through Spain while the Chinese acquired it from Baghdad. "Arab Music", says G. Sarton, "Was crossing the Pyrenees upon the wings of Song. Troubadours, Trouvers, and Minne singers popularised the new art and improved it". According to Farmer, "the greatest contributions of the Arabs was in the field of mensural music. Arabs supplied Europe with the name and forms of musical instruments. The English words like lute, rebec, guitar, organ and naker were derived from the Arabic *Al-ud*, *Rabab*, *Qitara*, *Urghun* and *Naqqara*".[1]

"With these instruments came several material benefits", says a European writer. "European minstrels, prior to the Arabian contact, only had the cithara and harp among stringed instruments and they only had their ear to guide them when tuning. The Arabs brought to Europe their lutes, pandores and guitars with the places of notes fixed on the finger-board by means of frets, which were determined by measurement. This alone was a noteworthy advance. Indeed, it was perhaps the fretting of the Arabian lute that registered the employment of the major mode for Europe".[2]

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[1]Legacy of Islam, page 373.

[2]Legacy of Islam, page 374.

Persian

The source of Arabian music may be traced to early Persian and Byzantine works. Long before the advent of Islam, Persians were the pioneers of music in the East. In the early days of Islam, the mensural music adopted by Hijaz and other theories connected with it had been influenced by Persian elements. Inspite of these borrowings there was a marked difference between Arabian, Persian and Byzantine music and later on the Persians also borrowed from the developed Arabian art. The golden period of Persian music begins with the 10th century A. D., when Persia produced some of the greatest musicians the world has ever known. The greatest luminaries amongst these were Farabi, Ibn Sina, Razi, Nasir-ud-din Toosi, Isfahani and Momin. Persia, the land of culture and arts has made invaluable contributions to the development of music.

Ishaq Al-Mausili (d/850 A. D.) recast the "Old Arabian system" and put forward his theories in a *Book of Notes and Rhythms.* He was attached to Abbasid court and being the master musician of his time he was the teacher of several talented musicians including Ziryab. He was a great patron of art and learning.

Isfahani wrote his celebrated musical work *Great Book of Songs* in the 10th century A. D. The book contains songs which were suitable for functions and occasions from the cradle to the grave. Different types of songs and music were prescribed for different functions and occasions. There were

suitable songs for war and peace, rejoicings and mournings. As Ibn Khaldun says, "No art begins until there were artists. We see a professional class of musicians in pre-Islamic days, and with the rise of the Caliphate, this class was held in highest esteem". The monumental work of Isfahani—*The great book of songs*, runs into 21 volumes which according to Ibn Khaldun may be called the "*Diwan* of Muslims". He has also written other books on music.

Al-Ghazali, born in 1058 in Toos, a small village of Khorasan, a province of Persia, rose to the high position of the celebrated principal of the Nizamiyah University. He has written a treatise on *Music and ecstasy*. Inspite of the legal condemnation by theologians the spiritual effect of music was clearly recognised. The *Sufi* looked upon it as a means of revelations attained through ecstasy, whilst the *dervish* fraternities regulated their rituals by it. The patronage of music by *Sufis* produced some outstanding writers on the subject including Alghazali who in his celebrated work *Music and ecstasy*, says, "Ecstasy means the state that comes from listening to music", and gives seven reasons for holding that singing is a very potent factor for producing ecstacy.

Abu Nasr Farabi. born in Farab (Persia) is the greatest musical theorist the Muslim world has produced. He died in 950 A. D. He composed several outstanding works on music. Among his books were the *Grand book on music* (*Kitab Mausiqal Kabir*), and *Styles in Music on the classification of Rhythm*. Besides the above, he has also dealt with musical topics

in two of his voluminous works on the sciences—the *Classification of the sciences* and the *Origin of the Sciences*. His *Grand Book on Music*, is recognised as the highest authority on the theory of oriental music and according to Farmer, a well known writer on Oriental Music, this work of Farabi, "deserves to be ranked as one of the greatest works that has been written on music". Out of the several great works of Farabi on music *Kitab Mausiq alKabir* has survived which has been recognised as the most important treatise on the theory of oriental music. According to Farabi he wrote this book because he found that the earlier books written by Greeks, Romans and Persians were full of obscurities and short-comings. Farmer pays glowing tribute to this great work of the famous musician, saying, "Al-Farabi's treatment of physical and physiological principles of sound and music is certainly an advance on that of the Greeks". Farabi has made a detailed reference of musical instruments which is non-existent in the works of the Greeks. He invented the musical instruments *Rabab* and *Qanun*. He also knew mensural music and recognised the major third (4 : 5) and the minor third (5 : 6) as consonances. Al-Farabi made a valuable contribution to physiological acoustics, which was not touched by the Greeks. He was also an outstanding practical musician of his time and when he played the flute in the presence of his patron Saif-ud-daulah he used to cast a spell over the audience directing their sentiments as he liked so as to cast his hearers into a fit of laughter, drew tears from their eyes and made them all asleep.

Undoubtedly Farabi, a versatile genius is the greatest theoretical musician that Persia has produced. The works of Farabi had an universal appeal and influenced the musical thought of the West as well as Muslim Spain. According to Farmer "Al-Farabi still continued to attract the attention of the scholars until the 17th century A. D.".[1]

Ibn Sina (980—1037 A.D.), a Persian national was the greatest thinker and encyclopaedist of Islam who ranks next to Farabi as the Musical Theorist. His *Kitab-al-Shifa* a philosophical encyclopaedia of repute also contains much original work on music. He also wrote an introduction to the art of music, whilst a few definitions regarding music are also found in his book *Division of Sciences*. The work of Ibn Sina considerably influenced the western writers of the subject and Roger Bacon recognised the contribution of Ibn Sina on the therapeutic value of music. According to a western critic, "Both Farabi and Ibn Sina are claimed to have added to what the Greek taught". Persians have made valuable contributions to the theory of the physical bases of sound, specially regarding the spherical propagation of sound.

The great oriental physician Al-Razi born in Rayy (Persia) in 865 A. D. has also contributed to the theoretical side of music.

Nasir-ud-din Toosi, a prolific writer on multifarious subjects, born in Toos, a village of Persia has written two books on music (1) *Kitab fi Ilmi Mausiqi* and

[1]Legacy of Islam, page 371.

(2) *Kanzul Tuhaf.* The musical theories of Toosi were elaborated by his great disciple Qutb-ud-din.

Saif-ud-din Al-Momin, (294 A.D.) a Persian by birth and one of the greatest theorists of music has expounded his theories on music in his celebrated books *Sharafiyya* and "Book of musical Modes" (*Kitab al-Adwar*). He laid down a new theory of scales in which the octave was divided into 17 intervals, which according to Sir H. Parry is, "the most perfect ever divided". Haji Khalifa says, "He was amongst those taking the front rank in the writers on the theory of Music". He was also a practical musician and had the distinction of inventing two stringed instruments—(1) *The Mughari* (an archlute) (2) *Nuzha* (a kind of a psaltery). Numerous commentaries have been written on the theories of Momin.

Qutub-ud-din Al-Shirazi, a disciple of Nasir-ud-din Toosi wrote *Durrat-e-Taj* which is counted as one of the most authentic contributions on the systematic theory of music.

Abul Faraj Al-Afghani, wrote his great compendium *Kitab al-Afghani*, which is a remarkable contribution to the subject. This monumental work was published in 20 volumes by the Bulaq Press, Cairo in 1868. According to several Western critics of Music, the Western World during the last 1,000 (Thousand) years has produced nothing to compete with this book. This book may rightly be called the encyclopaedia of oriental music.

Besides the above other notable Persian Theorists on Music are Abdul Qadir Ibn Ghaibi and Amuli.

Persians were also responsible for giving verse forms to vocal music, such as the ode and many shorter forms like *Qita* (Fragments), *Ghazal* (Love songs) and the more popular *Mawals*. Of these *Zajal* and *Muwanshah* were introduced into Europe. Persians also invented many new musical instruments which were adopted and became very popular both in the East and the West. Of these "Al-lud" (Flute) *Tabl* (drum) *Tanbur* (Pandore), *Qanun* (Psaltery), *Nay* (Flute) are noteworthy ones whose introduction revolutionised the practical music of the world.

Persian Muslims have undoubtedly made the greatest contribution to the cultural treasures of Islam and it was they who played the dominant part in the Islamic development of sciences and arts. In the contribution to music Persian theorists and practical musicians have had the lion's share and some of the celebrated works of the famous Persians like Farabi, Ibn Sina and Momin are unparalleled in the annals of the musical works of the world.

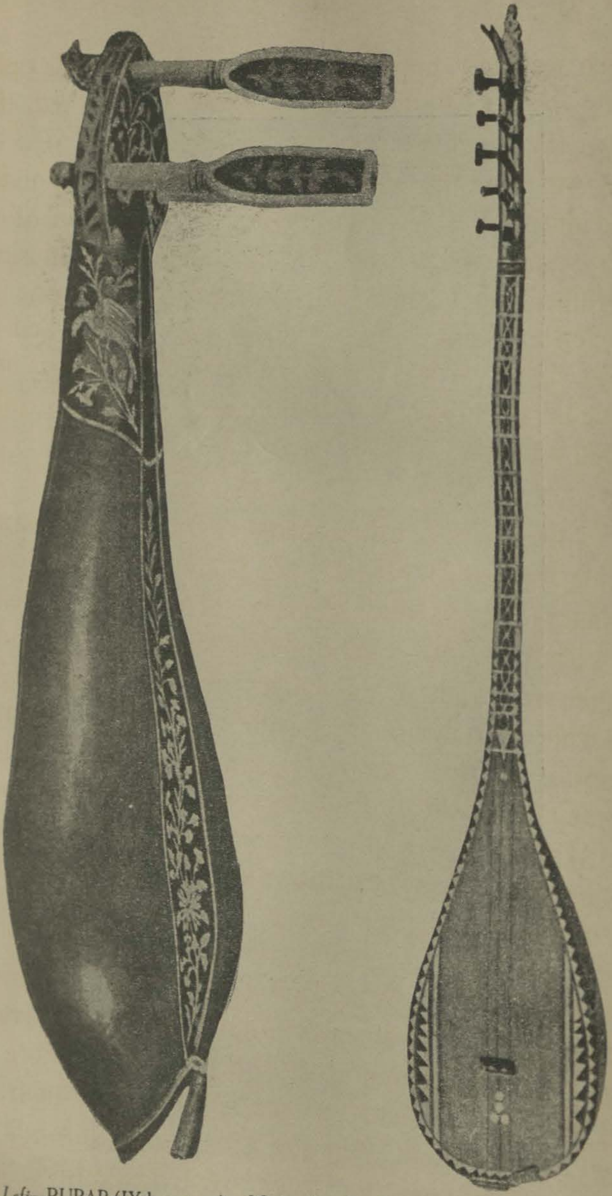
Musical Instruments

Arabs and Persians who produced many of the outstanding theorists and practical musicians of mediaeval times invented many musical instruments which were adopted and became popular throughout Europe, Asia and Africa. One of these was *Mizaf*

which was very popular and which included all open string instruments including the *lyre*, the *cithara*, the *harp*, the *psaltery* and the *dulcimar*. The *Ud* or lute was one of the earlier instruments commonly used during the first century A. H. which according to a western writer was "the most important musical instrument of Islamic people from the Atlantic to the Persian Gulf. Two kinds of *Ud* were used in those times. The Persians called their's *Barbat* and made no provision for a separate neck while the Arabs added a neck to it.

The musical instru ments used by the Arabs during the early periods of Islamic history were *Tanbur* (Pandore) and *Mizmar*. The only difference between the *Tanbur* and lute was that the latter had a smaller sound chest and longer neck. *Mizmar* were the wind instruments which were very popular among Arabs. The flute belongs to the same category and it was much used by Persians. Farabi had described the *Mizmar* as having eight holes for the movement of fingers over it, which was called *Nay* or *Surnay* by the Persians.

The *Qadib* or "Wand and Duff" or Tambourine are percussion instruments. The Duff acquired great popularity in different parts of the world where it was known by different names, namely—*Dep* in Iran, *Defik* in Kurdistan, *Dep* in Albania and *Adufe* in Iberia. The Spanish Moors were responsible for popularising Duff and Tamboure De Basque throughout the length and breadth of Europe.



Left—RUBAB (IXth century). Made of red juniper tree and cyprus wood. It is inlaid with mother of pearl over yellow and red tortoise shell. The keys are of ivory.

Right—A kind of lute used by Turkish minstrels. Inlaid with mother of pearl. IXth century.



AVICENNA GIVING A LECTURE ON ANATOMY.

The musical instrument which was commonly used in martial and processional music throughout the Islamic Domains was the "*Buk*" or horn or trumpet which were of different types namely *Karn*, *Nafir*, *Shabbur* and *Karana*. These were made of conch or of horn or of metal and were either straight or crooked in shape.

The *Tabl* was the most important instrument of martial music. It was of two types—the cylinder type and the bowl type. Drums and kettle drums were also commonly used in martial music.

During the early period of Islamic History the *Sanjo* was very popular among the Omyyads which was played to regulate the rhythm in dancing. It was of different shapes and sizes.

The Abbasid Caliphs were great patrons of sciences and arts and during their periods theoretical as well as practical music registered phenomenal progress. Zalzal a musician of repute attached to the court of the Abbasids invented a new type of *Ud* known as *Ud Shabbur* which may correctly be called a 'perfect lute'. Ziryab another musician improved upon the existing lute and introduced strings made of silk and entrails of young lions, which were much superior to the old ones. The *Shabrud* or arch lute was another musical instrument of importance introduced during the Abbasid reign. It was very popular in Baghdad. The *Rabab* a stringed musical instrument which is played with a *gawn* (stringed bow) was also invented during this period. This instrument has retained its popularity even up to the present time.

The *Qitara* which was later named *Guitar* in Europe was very much in use during the reign of the Moors in Spain.

Several types of bells or *Jaras*, large as well as small accompanied processional and martial music and were sometimes used in such manner as to increase the din of the battle so as to affright the enemy.

Indian

The enlightened West has considered all people inhabiting the vast Indo-Pakistan Sub-continent as Hindus—hence Indian music has wrongly been taken to be entirely contributed by the Hindus. Unfortunately the western historians being inspired by their Hindu counterparts have not only ignored the cultural, political and artistic enterprises of Muslim India but they have formed a biased opinion in favour of the Hindus. Notwithstanding their profound efforts in under-rating the cultural achievements of Muslims, such well-known historians and critics as Sir William James, Lt.-Col. James Tod, Augustus, W. Hunter Surendra Mohan Tagore, Anand Kumar Swami and Prof. Ranade had to admit though half-heartedly the valuable part played by Muslims in the development of Indian music. The Muslims since the time of Ameer Khusro who lived in the reign of Alauddin Khilji formed the vanguard of all cultural movements in India and were the pioneers in the domains of music. Ameer Khusro, born in 1253 A. D. at Pati Pali near Kanauj (U. P.) was a master musician, a man possessing extraordinary abilities and a versatile taste.

He wrote enchanting *geets* and composed many new songs which acquired great popularity even during his lifetime. He also invented a new type of *Sitar*. He enriched Indian music through his compositions, and innovations of *Khiyal, Kaul Kalbana, Zelf, Ghaza, Kadar* and *Tarana*. *Sazgiri* and *Khiyal* composed by him formed the culmination of his achievements which has earned an eminent place for him in the domains of Indian music. Prof. Ranade writing in his book on Indian Music says, "At the close of the 13th century when Muslims conquered Deccan after overthrowing the Devagiri ruler, the Islamic music began to influence the Indian music".[1] According to latest historical researches the originator of a new type of music in Northern India was Ameer Khusro, who not only formed new avenues but developed them to a high degree. Even after a lapse of 700 years, he is considered an authority in many branches of theoretical and practical Indian Music. Nawab Zulqadar Durgah Quli Khan, a courtier of Mughal ruler Muhammad Shah writing in his book, *Delhi in 12th century A. D.*, mentions more than 50 musicians including *Qawwals* Taj Khan, Moinuddin and Burhani who had earned great reputation as vocal musicians.

The rulers of Sharqi dynasty of Jaunpur were great patrons of music and were the first to advance active patronage to this fine art. *Khiyal* had become very popular during this era. Round about this period the Bahmani dynasty of Deccan and later on the rulers of Bijapur also showed much interest in the development of music. "Ibrahim Adil Shah"

[1]*Imroze*, Karachi.

says Zahuri, "was a master artist whose profound interest had popularised music in every house of his domain".

Akbar, the great Mughal Emperor was a well-known patron of cultural activities specially of fine arts. He had drawn to his court a team of at least 50 musicians from all parts of India who were experts in vocal and instrumental music. During the last 1,000 years India has not produced a greater vocal musician than Tan Sen Khan of Gawalior, who was a distinguished courtier of Akbar. He has become a legendary figure in the annals of Hindustani music. Other notable experts of instrumental music in the court of Akbar were Shahab Khan, an all-round instrumental artist, Dost Mashhadi, the flute player and Yusuf Mirasi, the *Tanbur* master.

Tozak-i-Jahangiri written by the cultured emperor himself mentions some celebrated vocal musicians who enlivened the durbar of Jahangir. These included Jahangir Dad Khan, Parvez Khan and Khorrum Dad Khan.

During the reign of Shah Jahan, Lal Khan the grand son-in-law of the famous Tan Sen had earned a great reputation as a vocal musician. Abdur Rahim Khankhanan a distinguished courtier of Akbar the Great was a benevolent patron of musicians and poets, whose munificence knew no bounds and has become proverbial.

India has produced many prominent Muslim theorists. Sher Khan wrote *Miratul Khiyal*, Abdul

Baqi Nahawandi wrote *Maasarul Umara*, *Rag Darpan* and *Risala Tan Sen*, and Syed Nizam-ud-din is the author of *Risala Ameer Khusro* and *Maadan-i-Mausiqi.* Hakim Muhammad Akram wrote a voluminous book entitled *Maadan-i-Mausiqi.* (The mine of music) detailing in it the achievements of innumerable vocal and instrumental musicians. The *Nagmat-i-Asafi* (The songs of Asafi dynasty), an outstanding work of Raza Khan published in 1813 revolutionised Indian music. He systematised and graded the songs in an orderly manner and introduced a systematic notation of Indian music which influenced the later musicians.

Maulana Abdul Halim Sharar, the well-known Urdu novelist in his presidential address delivered at the Music conference held at Baroda in March, 1916, said, "During the preceding centuries, Muslims dominated the Indian music and left far behind their Hindu counterparts in the pursuit of this fine art. At present all the eminent musicians in India specially in the courts of State rulers are Muslims who are experts in their professions".

The Muslims have undoubtedly dominated Indo-Pakistani music for the last thousand years. Even during the current century a galaxy of talented Muslim artists adorned the firmament of Indo-Pakistani music. Tan Sen of Delhi and Ustad Fayyaz Khan of Baroda have occupied the most distinguished place as musicians in the present century. Ustad Fayyaz Khan was recognised till his death as the best musician of the Sub-continent and in several all-India music conferences he was honoured with the title of "The

Master Musician of India", and the "Sun of Indian Music." The late Piare Saheb of U. P. was one of the best singers modern India has produced, who excelled in the art of singing *Pucca* songs (classical songs). Ghulam Ali Khan is universally acknowledged as one of the best vocal musician of the Indo-Pakistan Sub-continent. Muslims did not lag behind in instrumental music and produced some of the leading artists of our age. Inayat Khan in *Sitar*, Bundoo Khan in *Sarangi*, Abid Husain and Nathu Khan of Delhi in *Tabla* and Khan Saheb Hafiz Ali Khan in *Sarod* have been matchless.

Ustad Munir Khan (d/1938 A. D.) whose 89th birth anniversary has recently been celebrated at Bombay had been the most outstanding *Tabla* artist of India. Belonging to a reputed family of hereditary musicians of U. P. his father Ustad Kale Khan was a great exponent of the art of rhythm. Ustad Munir Khan was one of the few legendary figures who greatly contributed to the development of *Tabla* music throughout this Sub-continent. His disciples Amir Husain Khan, Shamsuddin Khan and Ahmed Jan have maintained the high reputation of their Ustad and according to a Hindu critic, "Their dexterity and originality are today unrivalled among *Tabla* players."

A few years back Ustad Mushtaq Husain and Ala-uddin Khan have been honoured as the best musicians of Bharat by Dr. Rajendra Prasad, the President of the Bharati Republic.

PAINTING

Arabs

The hostility of the orthodox theologians to all forms of representative art including painting provided only a temporary set back to its development. The Omayyad Caliphs who started a life of luxury and splendour and built magnificent palaces permitted figure paintings in private apartments specially in bath-rooms and *harems*, though such type of art was scrupulously excluded from public, political and religious edifices. The Omayyad Caliph, Al-Walid had his desert palace *Qasar-i-Amra* (712—715 A.D.) painted with frescoes depicting figures of six royal personages including the Caliph himself, sitting on a throne. A hunting scene depicted a lion attacking a wild ass and there were several nude figures representing dancers, musicians and buffoons. The background ornamentations consisted of draperies, foliage, vines, palm trees, cluster of fruits and desert birds.

The Abbasids who were great patrons of art, took a liberal view of the matter. The Abbasid Caliph Mansur had set upon the dome of his palace the figure of a horseman which probably served as a weathercock. Amin had his pleasure boats fashioned like lions, eagles and dolphins. The Abbasid Caliph, Al-Mutasim, the builder of Samarra (836 A. D.) had his palace decorated with exquisite frescoes of nude

female figures and hunting scenes. He had employed Christian artists for this assignment. Another Abbasid Caliph, Mutawakkil, who is said to have spent over 29,40,00,000 dirhams on beautifying Samarra, had employed Byzantine painters for the mural decoration of his palace.

The world famous Alhambra Palace of Granada (Spain) contains the figures of Moors represented as noble, knights and troubadours in roof paintings. The well-known court of lions contains exquisite statues of 12 lions carved out of marble. But the contribution of the Arabs to this art is still unknown as none of the books dealing with the history of Arabic paintings has survived.

Mughals

The Mughal emperors are distinguished as the great patrons of art and architecture. Being deeply influenced by Persian culture, the Mughal emperors afforded artists in their dominions the fullest opportunity for the pursuits of fine arts. Mughal painting, in fact is a pleasant blend of three main influences—namely Persian, Western and Indian. The Mughal art is realistic and in a way photographic and took 150 years for its full growth. Like Persian painting it is essentially an art of book painting. The first Mughal emperor, Babar who lived in the days of the celebrated Persian painter Behzad, had a critical taste for this art. His memoirs include a criticism of Behzad for being incapable of drawing beardless figures.

His gifted son, Humayun had employed Mir Sayyad Ali and Khwaja Abdul Samad, the latter being entrusted with the supervision of illustrating the tale of Ameer Hamza. About 50 painters worked on this plan and produced more than 2,000 illustrations painted on cloth.

The Mughal school of painting owes much to emperor Akbar, whose irreligiosity provided a great stimulus to all types of secular art. Artists, during his regime were free to produce on canvas and paper life in its varied forms. He came in contact with Western art through the Portuguese Jesuits. Akbar held occasional art exhibitions in his palace and awarded prizes. The interest exhibited by the emperor for this art created a healthy competition and produced more than 100 first class artists. He commissioned some of them to decorate with exquisite paintings the walls of his newly built palace at Fatehpur Sikri.

The talented Mughal emperor, Jahangir continued the patronage of fine arts like his father and Mughal painting during his regime was developed to a high degree of perfection.

Persia

Persia, which has the distinction of being the cradle of civilization in Asia has made lasting contributions to the development of Islamic fine arts.

The development of painting and other fine arts in Persia dates back to even before the Abbasid

Caliphate. During the golden period of the Abbasid Caliphate when arts and literature flourished, the Persian influence in fine arts, especially in paining, was very strong. Except for the ornamental wall paintings, which came to light in the Palaces of Samarra during the course of excavations, no traces of Persian painting of the Sassanian period has been found.

The first extant work of Persian painting of the Saljuq period dates to the 12th century and the tendencies evident in this work continued upto the end of the 13th century A. D. The works of this period are astonishing in their refinement of colour shading and the "forcible depiction of their subjects". The witty conceits of Abu Said of Serruj are highly commendable. The 'Minai' pottery of Raghes (c 1200) which borrowed the Baghdad style of painting was also prevalent throughout Persia.

Persian-Mongol School

The Mongol conquests of Central Asia, Persia and China enlarged the outlook on painting and introduced Chinese landscape painting into Persia. Till the beginning of the 14th century, the subject for painting in Persia generally was representation of historical events and legendary episodes. In the 14th century a new Persio-Mongol style of painting was developed which had its centre in Baghdad and Tabriz. The captions now were Persian and the art of miniature painting was Persianised. The great epics of Firdausi, Nizami and Kirmani were illustrated and translated into pictures. The heroic themes of

Shah Nama and the classical stories of *Shirin Farhad* and *Laila Majnoon* were transformed into living sketches. The selection of themes out of their national history and country side landscapes, gave the works of Persian artists a romantic touch visible in Gothic art. "It was in this period (14th century)" says a western critic of art, "That the harmony between picture and text reached the highest degree, and turning the leaves of extant manuscripts we are continually astonished at the skill with which the Persian painters filled their subjects into spaces allotted to them". Till the beginning of the 14th century, backgrounds used to be coloured red, then it changed to blue and at the end of the century a gold background was favoured. Other colours used were bright and lively. The landscape painted during the period was mostly of steppes, barren rocks, isolated trees, and a little rivulet running among stones bordered by shrubs and flowering plants.

Behzad of Herat

"An undeniable weakness of Persio-Mongol paintings" says a critic of art, "is in the diagramatical conventionalizing of figures, the spiritless treatment of heads and absence of expression in movements". In this respect hardly any progress was visible till the birth of the great personality of Behzad—a genius who is rightly honoured as the greatest painter of Persia who revolutionised the Persian art of painting. Behzad who was born before 1450 A.D. and died after 1520 A.D. represents the zenith of the Persio-Mongol and the beginning of the Safavid period of Persian paint-

ing. He was head of the Herat Academy till 1506 A.D., when Shah Ismail took him to Tabriz and made him Chief of the Imperial Library. Of his early works are *History of Taimur* illustrated in 1467 A.D., an illustrated edition of Saadi's *Bostan* completed in 1487 A.D. and the illustrated story of *Laila Majnoon* are preserved in Leningrad. "Behzad understood how, even in his most populous compositions, to differentiate every single figure in countenance and bearing; his *palette* was extraordinarily rich, specially in warm, full tones and this enabled him to individualise his portraits by the employment of numerous colour nuances for costumes and even for flesh." He reformed the painting of landscapes by making it more realistic and natural. He was the first to revolt against the dictates of the Calligraphers and chose his own line in this respect also. He left behind him a host of pupils both in Herat and Tabriz, who popularised his art and style throughout Persia, Turkistan and even in India and he was considered an authority on oriental painting till the beginning of the 18th century A. D.

The Tabriz School

The second great exponent of the Tabriz school of painting was the gifted Sultan Muhammad, who exercised much influence in the durbar of Shah Tahmsp. With the help of other artists he produced fine illustrated editions of Persian epics and he opened a new field for painters by introducing lacquer painting. Some of the best animal and hunting trapestries of the 16th century were made in his studio. He laid great emphasis on ornamental and floral forms of painting.

The Isfahan School

Isfahan, the great capital of the celebrated Persian monarch Shah Abbas was the centre of the arts and literature in the latter half of the 15th century. Imad-el-Husni (died in 1618 A.D.) and Ali Raza Abbasi competed in Calligraphy. Animal figures were very skilfully painted by the artists, who formed one of the most glorious periods of Persian painting. Ustad Muhammadi provided the link between the Tabriz and Isfahan schools and was the first to put his observation of nature on paper in purest ink wash technique without any reference to text. The successor of Ustad Muhammadi was the celebrated Raza Abbasi, who was one of the most remarkable artists Persia has produced. He excelled in the art of gay, sure handed colour sketches and drawings in red chalk on common subjects. He also used rich colour in paintings and his reputation as an artist rivals that of Behzad. He gave an impetus to the illustration of manuscripts and other decorative arts. His best pupil and friend was Moin, whose best extant work is the portrait of his Teacher. The style of Raza Abbasi was kept alive by Muhammad Qasim, Mir Muhammad Ali and Muhammad Yusuf till the beginning of the 18th century.

During the 18th century Persian painting was influenced by Western art and Nadir Shah brought from India the heritage of Mughal art. Lacquer painting of ordinary type gained much popularity in the first half of the 19th century and the great Persian art became a thing of the Past.

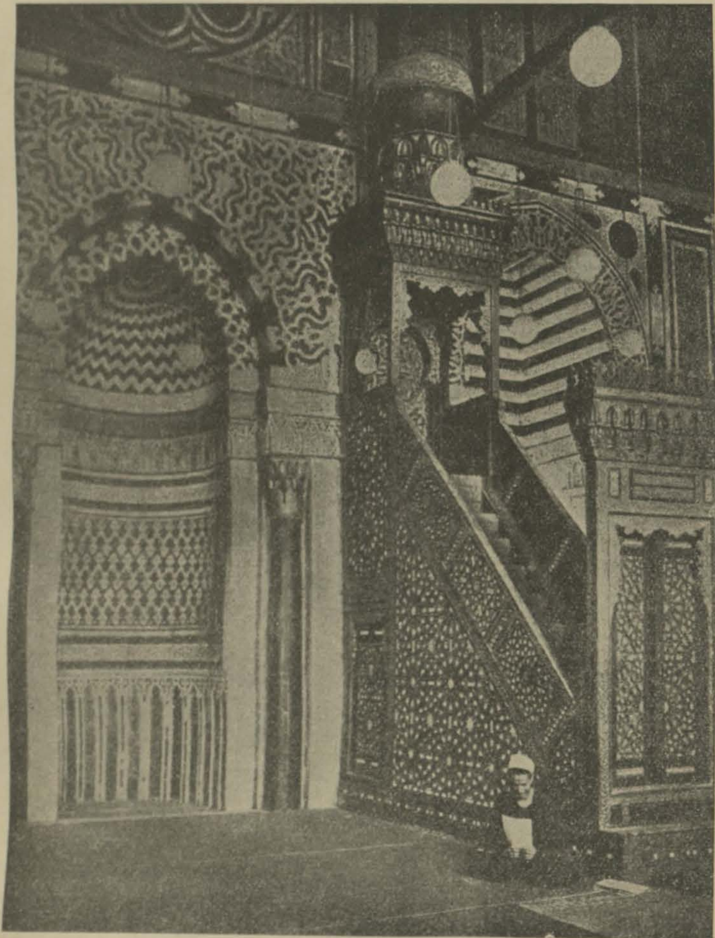
The Iranian painting influenced and stimulated the growth of painting in the East specially those of the Mughals in India.

ARCHITECTURE

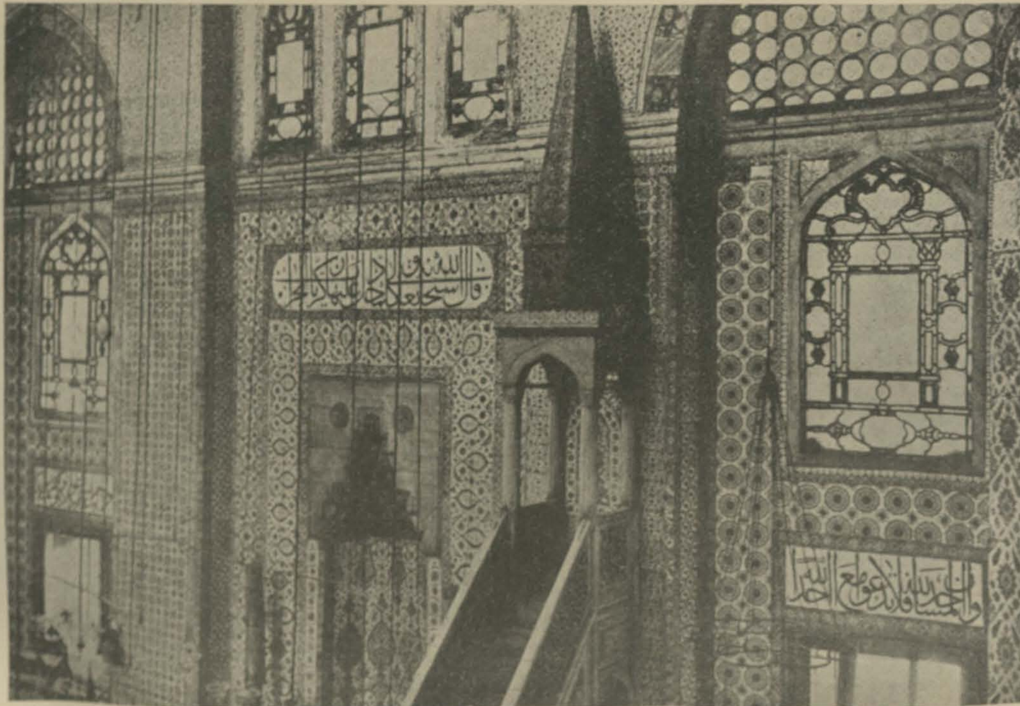
East

The East has always been rich in architectural monuments and some of the greatest monuments built during ancient times were found in the East. The Pyramids of Egypt, the Great Wall of China and the Hanging Garden of Babylon included in the Seven Wonders of the World were located in the East. The Pyramids of Egypt still remind people of the greatness of their builders, whose engineering skill enabled them to raise such massive pieces of stones to such great heights about 5,000 years ago when mechanical and engineering faculties were not as developed as today.

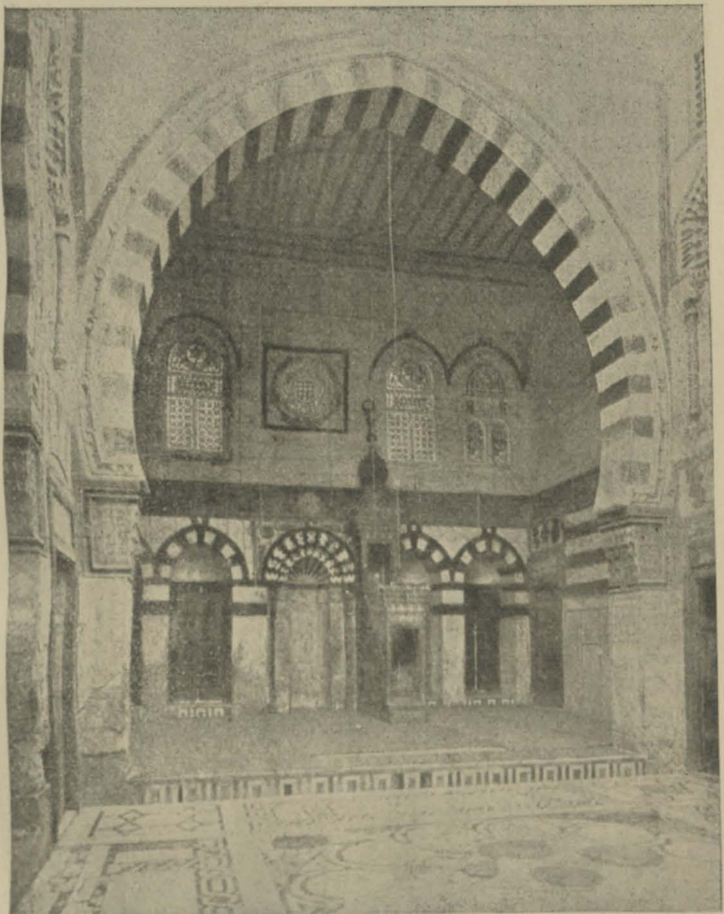
The Arabs who inherited the civilization and culture of the Greeks and Romans also brought about a great development in the architectural sphere. The mosque is the typical and principal Arab building, varying to some extent in form with different localities, but always retaining its main features. Mosques, the most original creation of Muslim genius which are found everywhere offer the best means of studying the architectural development of a country. In middle eastern countries religious and aristocratic buildings, such as mosques, shrines, tombs, palaces and castles predominate. The countries which abound in the finest architectural monuments of the Arabs, Persians and Mughals are Spain, Egypt, Iraq, Persia and the Indo-Pak Sub-continent.



AL MOAYAD MOSQUE — CAIRO (MAMELUKE PERIOD)



Here everything is blue. The columns, the walls, right to the cupola itself—are covered with tiles of an oriental azure colour. This is an enchantment from another world. (The Mosque of Rustem Pasha)



INTERIOR OF THE MOSQUE OF QAIT BAY, CAIRO.

The high pulpit (*minbar*) can be seen projecting in the centre, and to the right of it (left in the photograph) the mihrab.



MOSQUE OF IBN TULUN, CAIRO
One of the Arcades

Abbasid

Baghdad, the capital of the Abbasid was a city of palaces made not of stucco and mortar, but of marble. The buildings are not different in structure or style from those in Damascus and show Persian influence. The palaces were lavishly gilded and decorated. The imperial palaces of *Khuld* had a golden gate and a hall surmounted by a green dome 80 cubits high, which was the crown of Baghdad. The palace named *Dar-us-Shajar* had a tree made of gold with birds perched on its branches made also of gold and studded with gems. Another palace, the Hall of Paradise (*Aiwan-al-Firdaus*) with its magnificent chandeliers, its inlaid jewels on the walls, its paintings and ornamentations was a fairy sight.

Egypt

Egypt did not lag behind in erecting architectural monuments during mediaeval times and the mosque of Ibn Tulun provides the most splendid sight in Cairo. Other magnificent palaces of the Fatimids and the Ayyubids are in ruins.

Indo-Pakistan

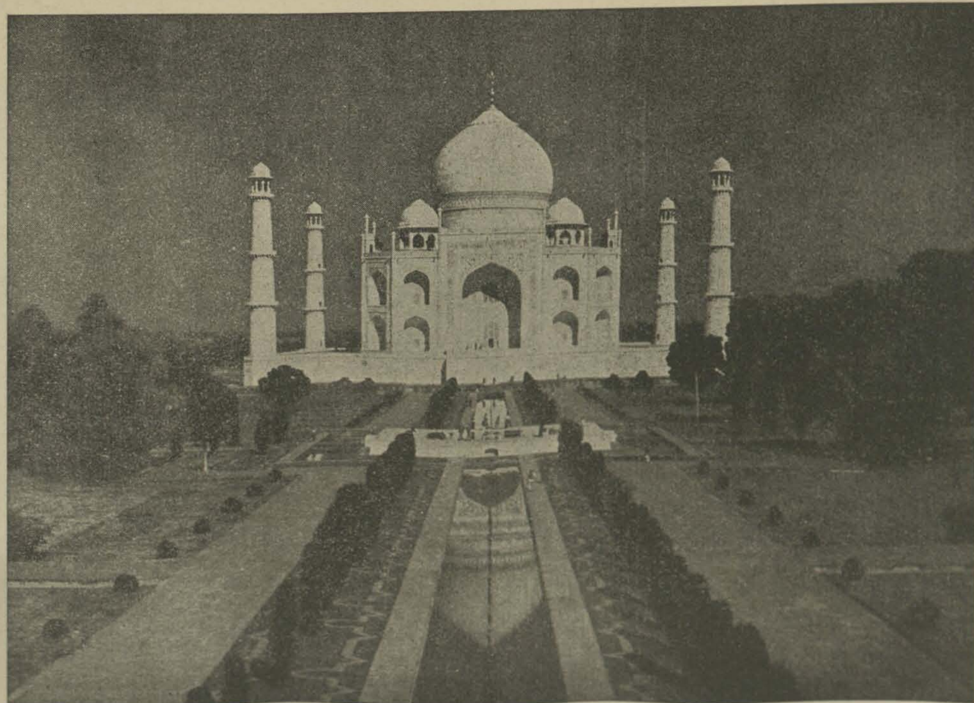
The Indo-Pakistan Sub-continent possesses some of the finest architectural monuments in the East.

The Mughal period is particularly noted for its fine architecture and Shah Jahan, the builder of the Taj Mahal, Jama Masjid of Delhi, the Red Fort and the marble palaces of Agra and Delhi is known as one

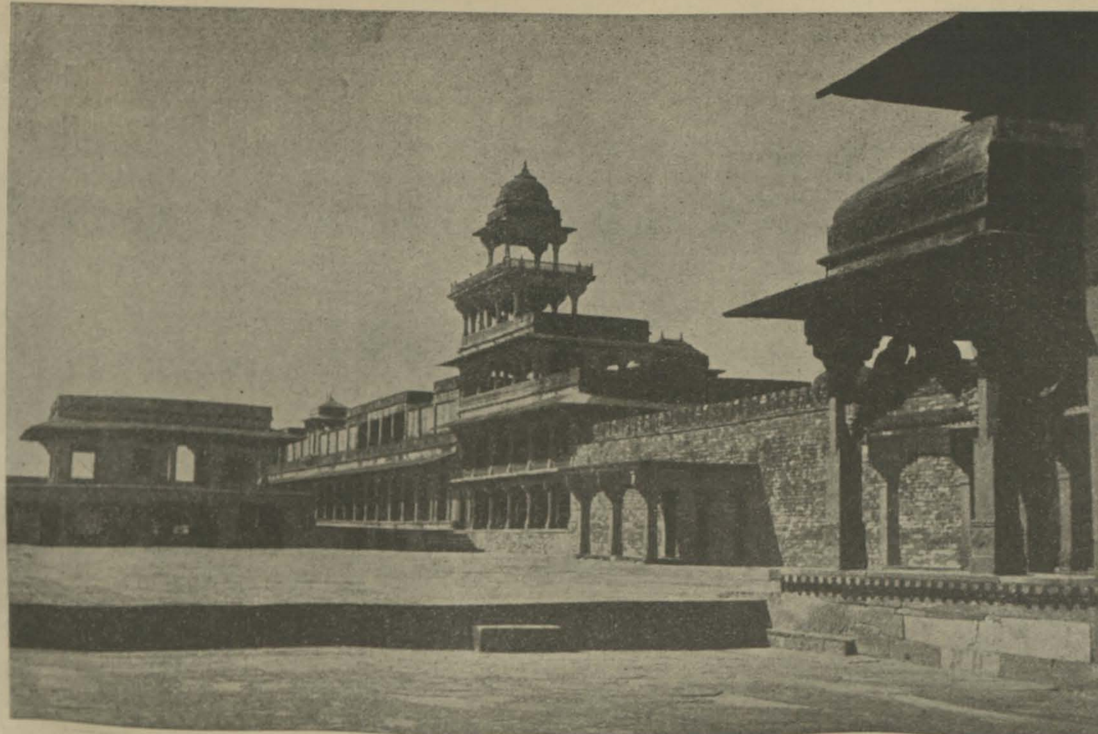
of the greatest builders in history. Jehangir was fond of paintings while Shah Jahan was fond of buildings—hence what Jahangir achieved on paper, Shah Jahan achieved in brick and mortar. The Taj Mahal, built of white marble, employing 20 thousand men for 22 years and costing 30 crores of rupees is undoubtedly the finest building in the world. It is 'Love or Lyric in Marble', and is unique in its evasive loveliness, which is so difficult to define in architectural terms but most expressive of the builder's intentions. Bernier says, "This monument deserves much more to be remembered among the wonders of the world than the Pyramids of Egypt". "It is an astonishing work", says Tavernier. Fergusson observes, "It is a combination of so many beauties, and the perfect manner in which one is subordinate to the other makes up a whole which the world cannot match". Harvel calls it, "A living thing with all the aesthetic attributes of perfect womanhood, more subtle, romantic and tender in its beauty than any other building of its kind".

The Pearl Mosque of the Delhi Fort is a sanctuary in which 'mysterious soul throbs between bliss and ecstacy'. Its charm lies in its simplicity and its chief attraction is the purity of its marble. It is a pearl without a flaw. "If fine ornamentation, floral designs artistic writings and intricate trellis work contribute to the charm of the Taj, the very absence of these add to the beauty of the Pearl Mosque".

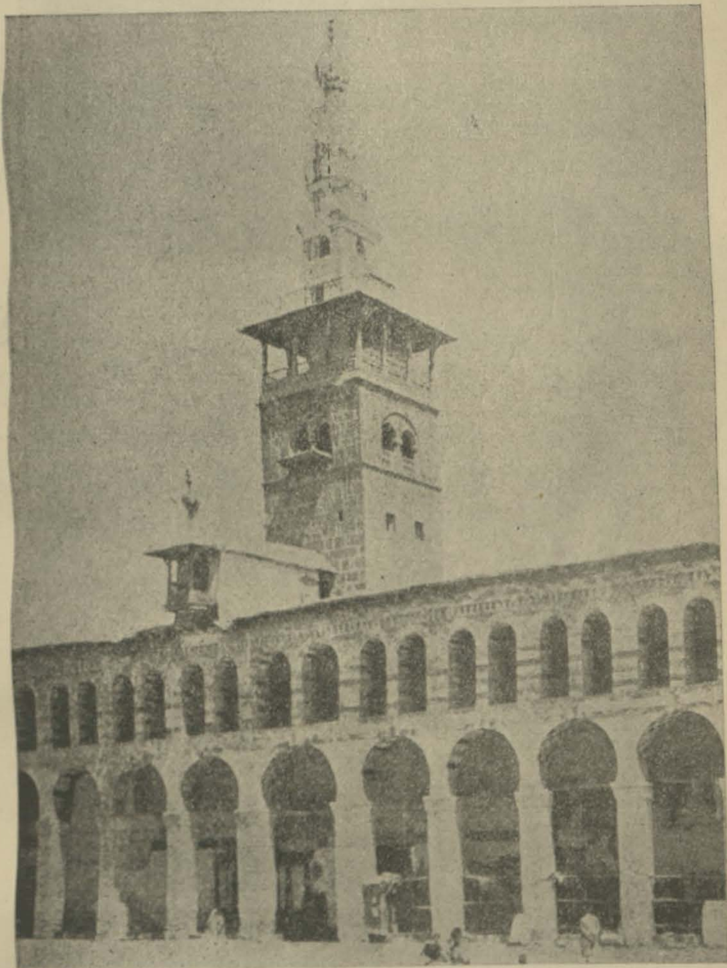
The Red Fort, started in 1639 and completed after 9 years, contains a number of beautiful marble



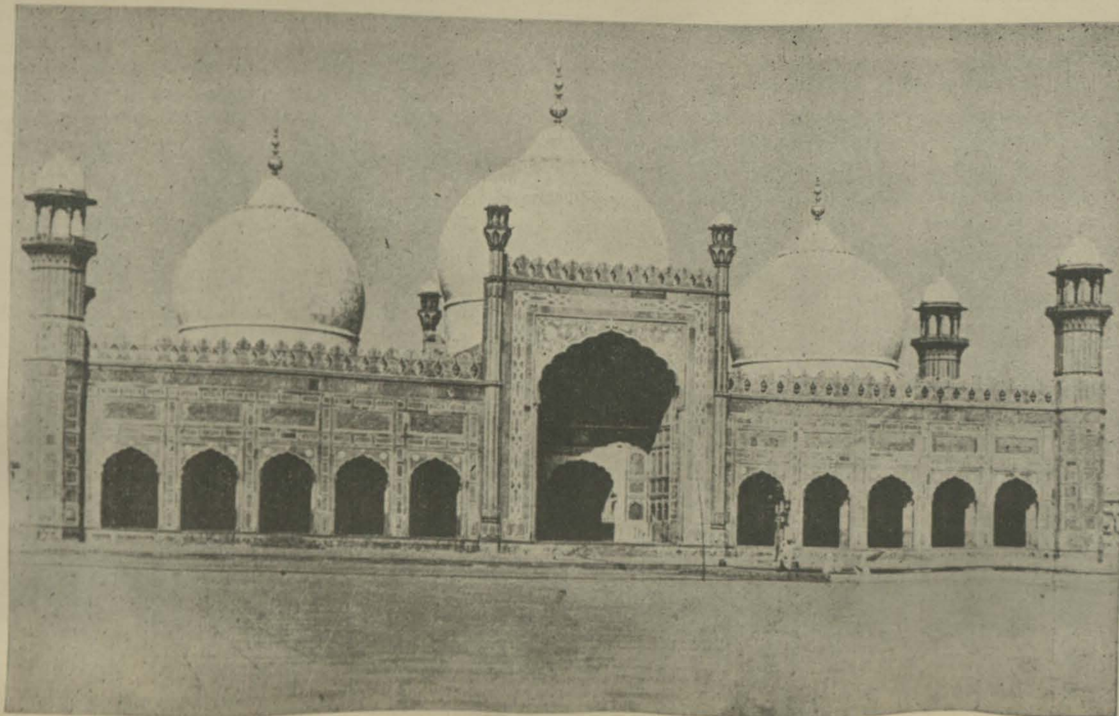
THE TAJ, AGRA.



Fatehpur Sikri, Agra.



THE GREAT MOSQUE, DAMASCAS.



Badshahi Mosque, Lahore.

courts and palaces including *Rang Mahal*, *Musamman Burj*, *Diwan-i-Aam* (Hall of public audience), *Diwan-i-Khas* (Hall of private audience) *Sawan* and *Bhadon*. The *Diwan-i-Khas* which housed the famous Peacock Throne is decorated most profusely with all sorts of ornamentations and a marble water channel called *Nahar-i-Bihishti* runs through the centre of the Hall and gives it an appearance of paradise—with the words inscribed on its walls "If there be a paradise on earth, it is this, it is this!"

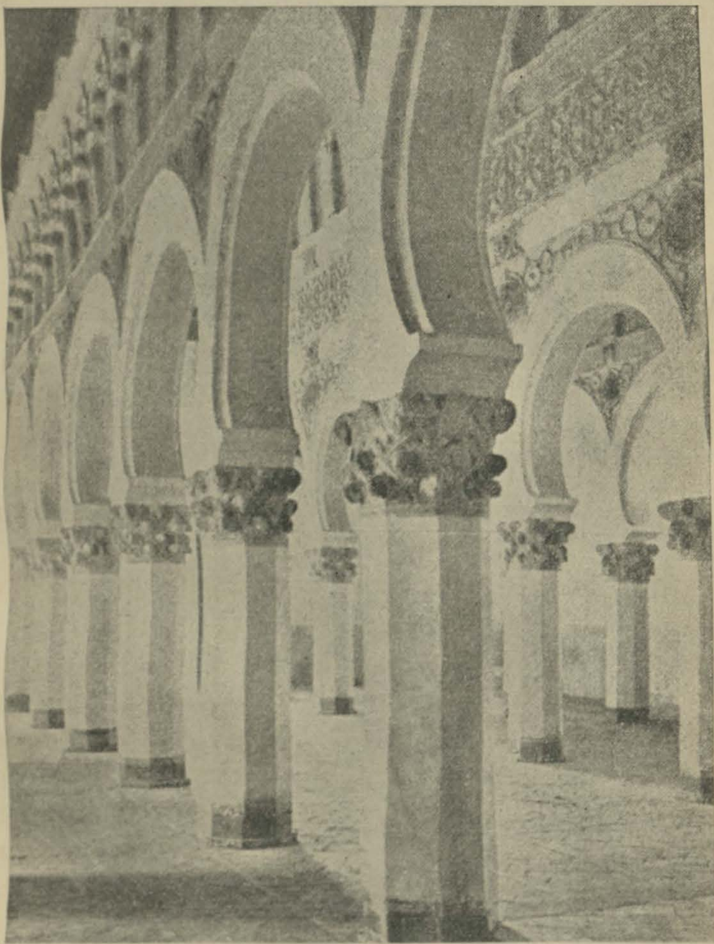
Jahangir is known for building some of the finest gardens in the East including the *Shalimar Bagh* of Kashmir which contained cypresses, marble channels of water, fountains and cascades.

Fatehpur Sikri, the deserted capital of the Mughal emperor Akbar contained some fine architectural monuments. Its Hall of Private audience has an exquisite carved pillar in the centre of the Hall. The Badshahi Mosque built by the Mughal emperor Aurangzeb in Lahore is one of the biggest and finest mosques in the world.

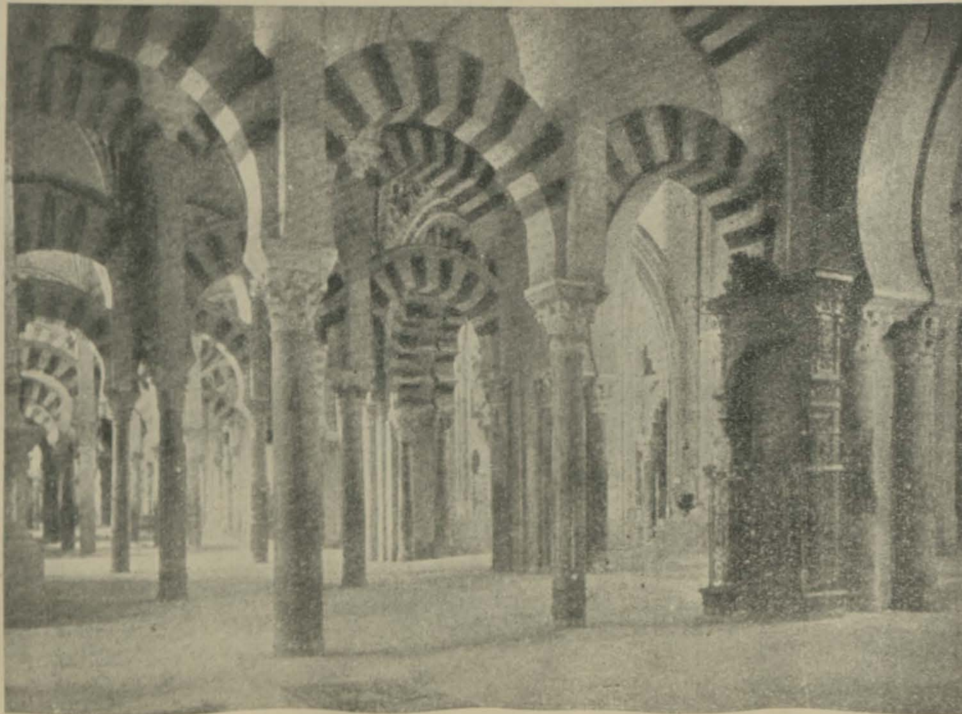
Spain

Of all the splendid architectural monuments built by Muslims in different parts of the world, Spain possesses some of the grandest. If India can boast of her Taj, Persia of the great Mosque of Isfahan, Baghdad of its majestic palaces, Cairo of its mosque Ibn Tulun, Moorish Spain may claim an outstanding place for her Alhambra and the grand mosque of Cordova which are considered the marvels of architecture.

In Spain too, the mosques, which are found everywhere, offer the best means of studying the architectural development of the country. After the fall of the Omayyad (750 A.D.), when Abdur Rahman founded a kingdom of his own in Spain he developed the old Syrian architecture on individual lines. The earliest example of this style are represented by the Sidi Oqba mosque at Qairuan and the Az-Zituna Mosque at Tunis. The hall for a mosque was introduced in this period and in the East there used to be a courtyard surrounded by a colonnade which contained a water basin for ablutions. A lofty quadrangular tower served as minaret, while opposite the *Mahrab* was situated the *Maqsura* (the chieftain's lodge) crowned with a dome. The great Mosque of Cordova had been built on the above plan. Horse-shoe arches of alternate red brick and white key stones rested on slender pillars and above them rose a second storey of round arches of the same type as supported the original cedarwood ceiling. It is a large congregational mosque with a deep sanctuary containing eleven galleries separated by arcades, each with twenty columns. The *Maqsura* contained richly decorated lobar arches and horse-shoe arches where the dome sprang from two intersecting quadrangles of arches. The *Mahrab* was decorated with Byzantine glass mosaic. In other parts of the building plastered floral forms predominate in the decorations. The *Minbar* is richly carved and the *Mahrab* is covered with glazed tiles. "This plan, with its slender stone pillars" says a celebrated European writer, "horse-shoe and lobar arches,



Inside view of Grand Mosque of Cordova (Spain).



INTERIOR OF THE GREAT MOSQUE OF CORDOVA.

tiling and stucco (glazed) arabesques, in later centuries was carried on into graceful style, a kind of Magrebine rococo and remains the distinctive characteristic of all Moorish and Mudejar art in Spain till the 16th century".[1]

The glory of Cordova is *Mezquita* or Mosque which was converted into a cathedral by the Christian conquerors. It was begun by Abdur Rahman II (756—788 A.D.) continued by Al-Hakim II and completed by the Vazier of Hisham II (976—1009 A.D.). The mosque is rectangular measuring 590 feet by 425 feet, 113 sq. feet of which is occupied by the famous 'court of oranges' and cloisters surrounded it on three sides. On the south of the courtyard, lies a labyrinth of pillars made of many coloured marble. The 850 pillars divide the building into 19 North to South and 29 East to West aisles (galleries). Each row supports a row of open Moorish arches of the same height (12 feet) with a third and similar row superimposed upon the second. The wooden ceiling richly carved and polished is still intact. The *mahrab* of the mosque where the *Imam* stood presents the best type of workmanship, in which a small octangonal recess (corner) is roofed with a single block of white marble carved in the form of a shell. Its walls are decorated with Byzantine mosaics. "But the most original contribution of Cordova to architecture" says J. B. Trend, "was the system of vaulting based on intersecting arches and visible intersecting ribs, a system which attacks the main problem of architecture—that of covering space with a roof—

[1]Encyclopaedia Britannica 'Muhammaden Art'.

in much the same way as the system of Gothic vaulting which developed two centuries later".[1]

The palace of *Az-Zahra* built by an-Nasir, situated at a distance of four miles from Cordova was one of the best palaces of the world. It is built of many coloured marble—white, rosy, onyx and green. The eastern hall contained fountains jetting out of the mouths of different animals made of gold and set with precious stones. The *Diwan-i-Aam* was a remarkable piece of workmanship made of marble and gold set with jewels. According to the old writers, "it was impossible to give in words a proper description of 'the boldness of the design, the beauty of the proportions, the elegance of the ornaments and decorations, whether of carved marble or of molten gold, of the columns that seemed from their symmetry as if cast in moulds, of the paintings that equalled the choicest bowers themselves, the vast but firmly constructed lake, and the fountains with the exquisite images".[2]

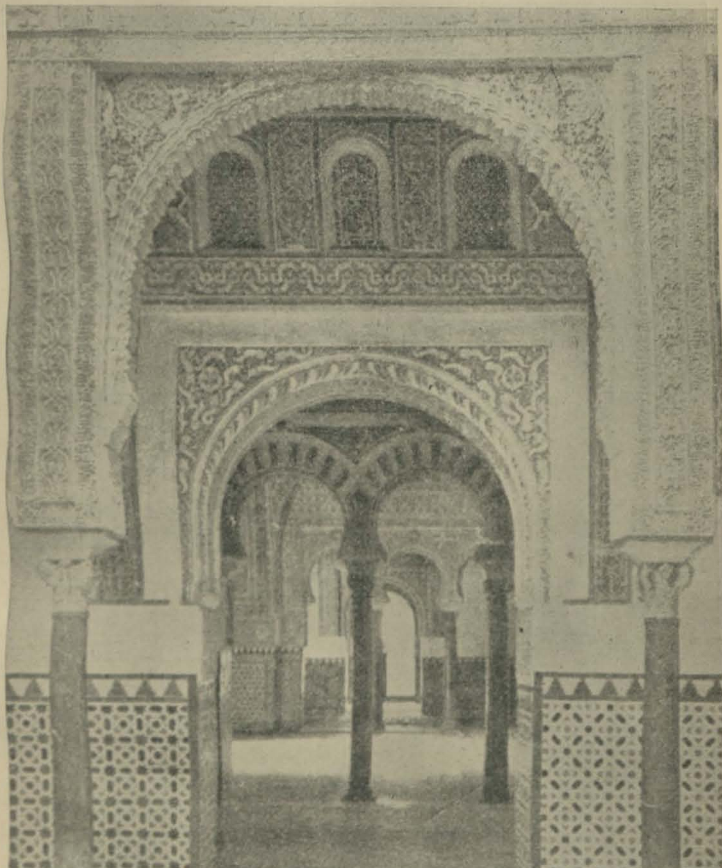
Alhambra

Alhambra, the finest of all Moorish monuments and universally acknowledged as one of the wonders of the world is situated in Granada. It has not been fully established by historical records as to who was its original builder, but it has been proved by latest research that the fortress of Alhambra existed long before the advent of Al-Ahmar, the rulers of Granada. The first mention of this fortress found

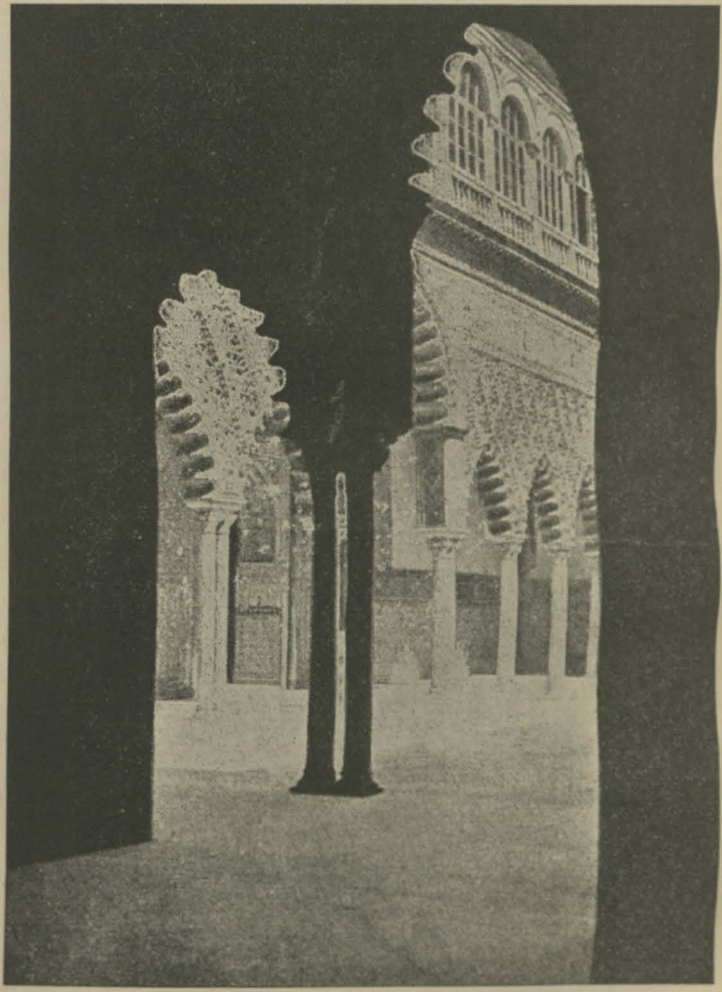
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[1]Legacy of Islam, page 12.

[2]A Short History of Saracens, page 518.



ALHAMBRA—GRANADA (SPAIN).



ALHAMBRA—(SPAIN).

in historical records is during the reign of Amir Abdulla, the sixth Omayyad monarch of Spain, when in 890 A. D., Sa'wwar, the Muslim general, was obliged to take refuge in this fortress due to the rebellion of the neighbouring tribesmen. Again in 1161 A.D, when Ibn Abdul Momin had shut himself within the four walls of the impregnable fortress of Alhambra, Moratabin laid siege to it which lasted for a pretty long time. The monarchs of the Al-Ahmar dynasty, who established themselves as the rulers of Granada in 1232 A. D., are distinguished for having a fine taste in architecture and are responsible for building one of the finest palaces in the world, known as Alhambra. The fortress and its four walls, as already explained existed long before the construction of the inner palaces. Abu Abdulla Muhammad Salis (1302—9 A.D), Abul Hajjaj Yusuf I (1330—54 A.D.) and Muhammad Khamis Al-Ghani Billah (1354—59 A.D,), the rulers of Granada were mainly responsible for the construction, enlargement and the architectural decorations of the palaces of Alhambra. These palaces which have witnessed the pomp and pageantry, trials and tribulations of the successive Al-Ahmar monarchs ultimately fell into the hands of Christians in 1492 A. D. The splendid decorations of the interior is ascribed to Yusuf I who died in 1354 A.D.

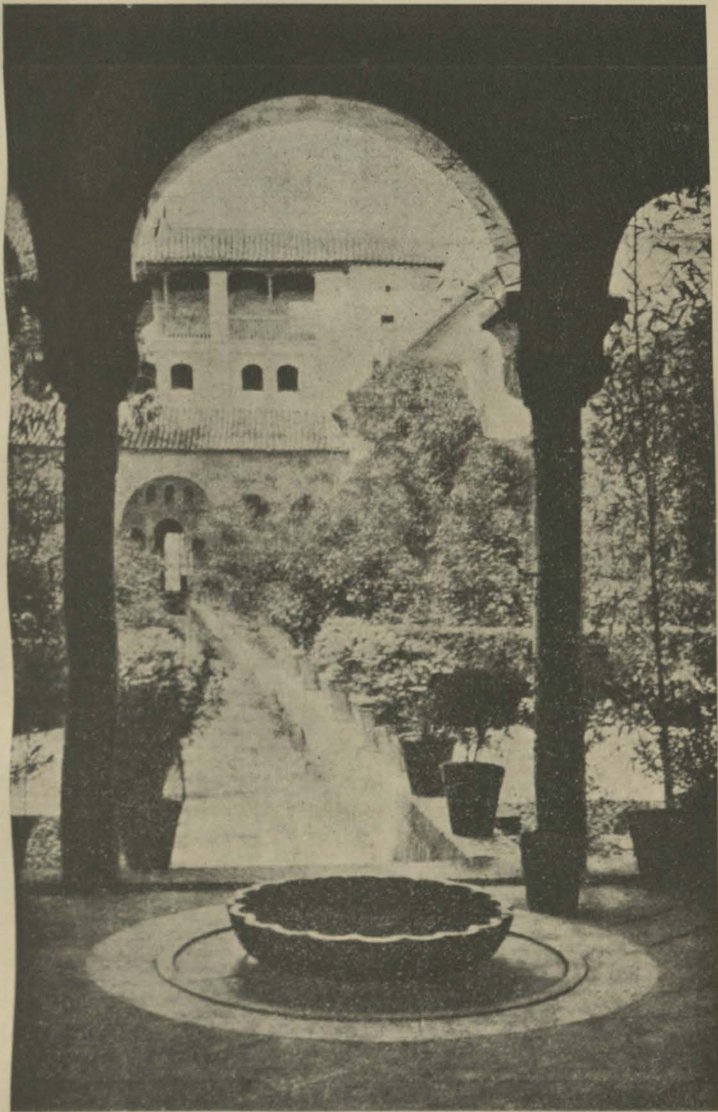
This unique piece of architectural art was disfigured and in places demolished by the Christian conquerors and rulers. Charles V changed the lesser mosque adjoining the Court of Myrtles into a chapel

and disfigured the old royal abode by demolishing the southern wing, which probably contained the main porch. He was not contented with this and did even worse when he replaced it with a building of renaissance style, with a showy facade which was an ugly contrast to the simple outer walls of the old palace. The great mosque of Muhammad III was razed to the ground and was replaced by the church of Santa Maria in 1581 A.D. According to a western historian, "In subsequent centuries the carelessness of the Spanish authorities (Christian Monarchs) permitted this masterpiece of Moorish art to be still defaced".[1] It was damaged by French invaders in 1812 A.D. and further by earthquake in 1821 A.D.

Site

Alhambra is situated on a hilly terrace in the midst of rare natural surroundings. The plateau, river and the beautiful gardens and forests have all added to its natural charm. This fortress is surrounded on three sides by the river Douro, and has an entrance on the south-eastern side. Its outer walls are constructed of superfine red bricks, hence it is called Alhambra, meaning 'red' in Arabic. Like many Christian castles, it has a three-fold arrangement—a castle, a palace and a residential annexe for subordinates. The Alcazaba or castle is the oldest part, built on the dangerous foreland, and only its massive outer walls, towers and ramparts are still intact. A short distance from Alcazaba is the Alhambra proper, the palace of the Moorish Kings and

[1] Encyclopaedia Britannica "Muhammadan Art".



GRANADA
The garden of the Generalife.



THE COURT OF LIONS IN ALHAMBRA—(SPAIN).

adjacent to it is Alhambra Alta originally built as the residence of the officials.

Palace

Alhambra is a villa surrounded by extensive gardens and parks. One enters the Alhambra park through the gate of pomegranates which is a grand arch built in the 15th century A.D. A steep ascent leads to the main entrance of the palace, which is known as the "gate of judgment" and is a massive horse-shoe archway, surrounded by a square tower, which served as an informal "Court of Justice". A small door leads to the "Arab Palace", from which a corridor leads to the "Court of Blessing" or "Court of Pond". This is 140 feet by 74 feet and in its centre is located a large pond set in marble pavement, full of gold fish and with myrtles growing along its sides. It has galleries on the north and the south. The 27 feet high principal entrance supported by marble pillars is on the south. The "Hall of Ambassadors" is the largest hall in the palace of Alhambra. It is a square room whose sides are 37 feet in length and its central dome is 75 feet high. This was the grand reception room and the throne of the Sultan was placed opposite the entrance.

The celebrated "Court of Lions" is an oblong court measuring 116 feet by 66 feet supported by a low gallery resting on 124 white marble columns. A pavilion projects into the Court at each corner with ornamented walls and a light domed roof, elaboratel decorated. The lattice work of the walls is extrem

fine. The floor is covered with many coloured tiles and slender pillars made of white marbles. The walls up to a height of 5 feet are inlaid with blue and yellow tiles whose borders are polished with blue and gold. The famous fountains of lions are in the centre of the courtyard where a magnificent alabaster basin is supported by 12 lions made of white marble.

The "Hall of Abencerrages" is a room which is a perfect square crowned with a high dome containing latticed windows in its lowest part. The roof is painted with bright blue, brown and gold and the columns supporting it spring out into the arch form in an exquisite manner. Opposite to it is the hall of "Two Sisters", which contains a fountain in the centre. A dome honey-combed with about 5,000 tiny cells, a magnificent example of the "Stalactite Vaulting of the Moors", forms the roof of the Hall.

The famous vase of Alhambra which is a remarkable specimen of Moorish art represents the invaluable original furniture of the Palace, which was made in 1320 A.D.

Alhambra is undoubtedly a marvel of the architectural ingenuity of man. Writing in his celebrated work *A Short History of the Saracens*, Ameer Ali, the famous Muslim writer, says, "The towers, citadels and palaces, with their light and elegant architecture, the graceful porticos and colonnades, the domes and ceilings still glowing with tints which have lost none of their original brilliancy; the airy halls, constructed to admit the perfume of the surrounding gardens; the

numberless fountains over which the owners had such perfect control, that the water could be made high or low, visible or invisible at pleasure, sometimes allowed to spout in the air, and at other times to spread out in large oblong sheets, in which were reflected buildings, fountains and serene azure sky; the lovely arabesques, paintings and mosaics finished with such care and accuracy as to make even the smallest apartment fascinating, and illuminated in various shades of gold, pink, light blue and dusky purple; the lovely dados of porcelain, mosaic of various figures and colours; the beautiful Hall of Lions with its cloister of 128 slender and graceful columns, its blue and white pavement, its harmony of scarlet, azure and gold; the arabesques glowing with colour like the pattern on a *cashmere shawl*, its lovely marble filigree filling in the arches, its beautiful cupolas, its famous alabaster cup in the centre; the enchanting Hall of Music . . . . ; the beautiful seraglio with its delicate and graceful brass lattice work and exquisite ceilings; the lovely colouring of the stalactites in the large halls and of the conical linings in the smaller chambers—all these require a master's pen to describe".[1]

The inscriptions found in the palace relate to its decorations and not to its erection. The major part of construction and decoration were done by Yusuf I. The decorations around the Court of Lions and further eastward were made in the reign of Muhammad V.

Comparison

The palaces of Alhambra built in the 13th century

[1]A Short History of the Saracens, page 568.

A.D., mark the transition from the Saljuq art in Asia Minor to the style of the Persian monuments. The grandeur of Alhambra may only be realised, when it is compared with contemporary buildings—e.g., with the great Mosque of Sultan Hassan built in 1356—59 A.D. which serves as a striking contrast to Alhambra. "Alhambra is unique", says a European writer, "No other example of the Islamic palace of so early a date and in such relatively good condition has yet been found". The two adjoining courts in the "Hall of Ambassadors" resemble the ancient houses of Pompeii. "The well-known Courts in the style of the Cosmatic in Rome", says a well-known westerner, "with their exotic and fairy like ornament can only be accounted for as imitations of these Moorish Palace Courts". The plan of dividing the Palace into a system of courts and pavilions in the midst of gardens as is visible in the Safavid Palaces of Isfahan and the old *Sarai* of Istanbul was probably imported by Moors from Persia.

Iran

Architecture in Iran is distinguished for its refinement and delicacy. Contrary to the huge and massive monuments built by the Mughals and Turks, Persian architecture has a gracefulness all its own.

Persian Muslims who formed the vanguard of all cultural and artistic movements in the Islamic world introduced many innovations and beautiful designs in architecture. Unfortunately Persia had never been the seat of any of the Islamic Caliphates or great empires,



THE SALIMIA MASJID, ADARNA.



Masjid Sultan Ahmad, Istanbul.

hence one does not come across big palaces, mosques and other grand buildings as are found in Baghdad, Damascus, Istanbul, Cairo, Cordova and Delhi. But, in spite of this handicap Persia did not lag behind in producing some of the greatest intellectual and artistic luminaries of the Islamic world and whatever architectural monuments are found in Persia have their own peculiar charm and style.

In Islamic countries such buildings as monastries, mosques, tombs and palaces are found in large number. The Persians brought about a great change in the style and architectural design of mosques. Due to ever increasing number of mosques, congregations had very much decreased and Persians were obliged to design a new type of mosque in order to meet the requirements of the time. This is called the Persian type of Mosque which had a *Madrassa* attached to it. In this typical Persian design, the mosque courtyard used for ablution as well as for prayers is surrounded by two storeyed verandahs behind which are situated small rooms for teachers and students. From the middle of each side run open halls, open to the front and roofed with a vault of ogee arches. Each hall called *Iwan*, containing *Mahrab* and *Minbar* serves as lecture room. Such *iwans*, twice as high as the adjacent part of the building are splendidly ornamented and flanked by small minarets. A smaller *iwan* of the same type serves as the gateway. The main *iwan* is crowned with a dome narrowed at the bottom and it contains the founder's Tomb or *Mahrab*. Writing about these mosques a well-known European writer says, "With their slender minarets their mag-



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nificent *iwans* and gateways and their lofty domes (often gilded)—these buildings are among the most astonishing buildings of the East". The walls of these mosques are always overlaid with mosaic of dull or glazed bricks and smooth tiles of various colours which are artistically decorated with lines of carved Arabic script and flower arabesques. The slender pillars immensely add to the charm of the buildings. Unfortunately these buildings are in a state of decay. The most celebrated of this type are "The Blue Mosque of Tabriz" and the "Masjid Shah" at Tabriz which were constructed in the 15th century A.D. Other mosques of similar or slightly older type are the great mosque of Veramin (1322 A.D.) that of Isfahan (11—14 century) the mosque containing the Tomb of Imam Raza at Mashhad (1418 A.D.) and the Masjid Shah at Isfahan (1600 A.D).

In the Juma Mosque of Isfahan, a quadrangle surrounded with four *iwans* of Persian *madrassa* was added to the old Piered Mosque. This mosque was originally built in pillared mosque and frequently enlarged and as usual was surrounded with bazaars.

The ancient Friday Mosques have not survived in Persia except a few old parts standing in a great complex of buildings that formed the great mosques of Isfahan and Shiraz. Abu Muslim in the reign of Caliph Mamun built two big mosques in Merv and Neshapur of which the latter was built on pillars of wood and designed in typical Persian style. An old mosque of the 10th century A.D. has survived in Naizin, an old desert city of Isfahan. The *iwan*

and *mahrab* court were added to the mosques of Persia in the 11th century. The Friday Mosque of Isfahan built in the 12th century A.D., is one of the finest and largest congregational mosques of the East. This is built of bricks and decorated with plastered Reliefs and Polished Tiles. Its minarets being cylindrical in shape and placed in pairs are covered with glazed tiles and are not very high. It was in Persia that the art of ornamentation and arabesque in architecture was most developed and Persians made the greatest use of glazed coloured tiles in their buildings. From the 13th century onward Persia and India made the greatest advancement in architecture and Persia developed its own style. The art of arabesque which became very popular in Islamic architecture was widely adopted by the Western world.

The favourite form of princely Tomb in Persia from the 10th to the 14th centuries A.D. was that a Tower was constructed over the grave surrounded with circular ground plan. A conical roof rested on the projected ornamented walls beneath which was the grave on which was inscribed in beautiful carved letters the name, titles and date of death of the deceased. The finest tomb of the kind is that of Momina Khatoon at Nakhichavan.

Among the old type of Persian Palaces are *Qasr-e-Amra* with vaulted baths adorned with frescoes and the *Hira* found at Mshatta. These are rectangular Castles and in order to reach the hall of audience one has to pass through a number of ante-rooms. Attached to the hall are the princes apartments and *Harem*.

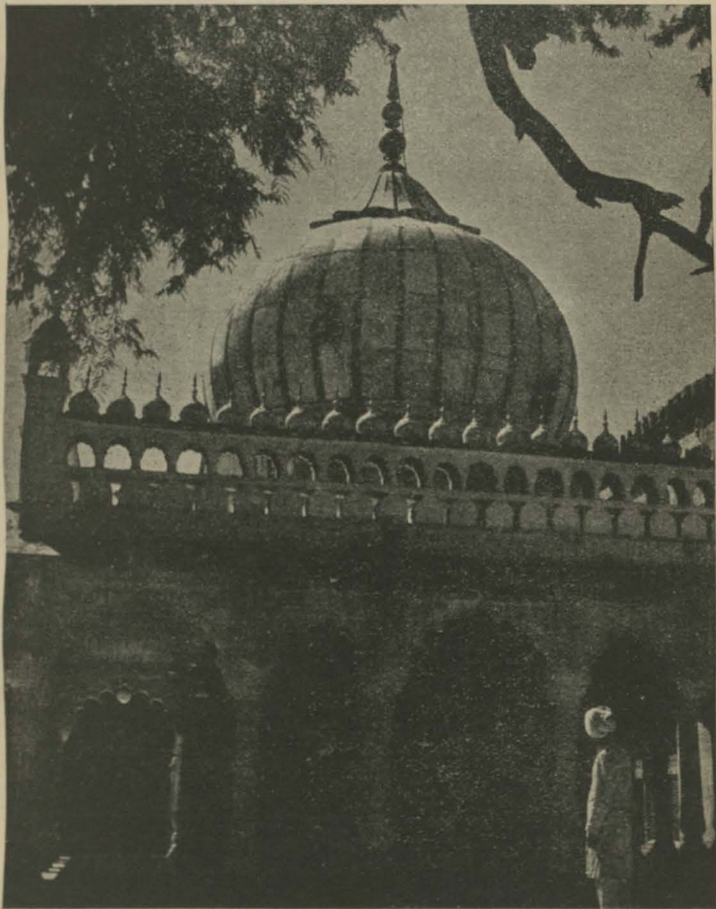
At the back is a private garden and soldiers quarters are on both sides.

Caravansarais in Persia which were fortified hostelries for travellers were built on the plan of a *Iwan* mosque—the rooms were used as stalls and guest rooms. There were carved streets in the attached bazaars, and they had pillars with round arched vaulting in the west and long rows of curved arched vaults in the east. The old type of *sarais* found in Istanbul were decorated with tiles copied from Persia.

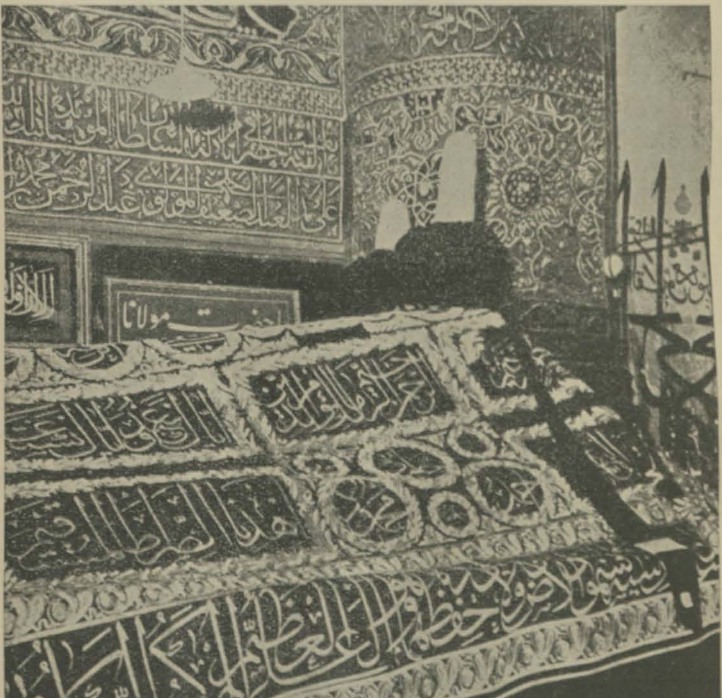
Almost all the old Persian bridges have disappeared. The two very beautiful bridges joining Isfahan and Zulfa constructed in the 17th century still exist and have two storeyed superstructures and pavilions.

Private houses are of varied type—reception and living rooms are separated from female apartments and a second courtyard is provided for them. There are different devices for cooling apartments in the East and West. In Mediterranean countries where water is in plenty there are constructed half darkened inner halls containing springs while in dry Persia and Iraq there are underground summer apartments with projecting ventilators.

A dome is the favourite feature of Islamic architecture. In Cairo it was pompous while in Persia it was bulbous and carved with glazed tiles. The cylindrical shaped minarets of Persia were not much used in other Islamic countries.



Mausoleum of Nizamuddin as seen from the western side. Note the imposing dome and the colonnade in front.



The tomb of Maulana Jalal-ud-din Rumi in his mausoleum at Konya.

In Muslim countries mostly horse-shoe or pointed horse-shoe arches were designed. The semi-circular or two centred arches were not much employed. The typical Persian arch of which the springing curve turns into straight lines was commonly used in Persia for a long time and at times resembles the "Tudor" arch.

Battlements in buildings were fully decorated with floral forms or cut into saw-teeth. The windows of old Persian buildings were carved with lattice work in which coloured glasses were fixed.

In Persia buildings are generally made of bricks and glazed tiles too are frequently used here. These tiles were primarily of geometrical forms but later diverse floral forms were introduced.

One of the most popular branches of Muslim architecture is that of ornamental writing, which is employed with great success in the decoration of mosques, tombs and palaces where lines from the Holy Quran are carved or inlaid round domes and minarets, doors and arches. Persians developed this art to a great extent and widely used ornamental writings in the decoration of tombs and mosques.

In beauty and grace, in design and simplicity, Muslim architecture is superior to any in the world.

The Mughal Architecture in East Pakistan

The great Mughals who splendidly ruled over the Indo-Pak Sub-continent for more than four centuries are known as the greatest builders in history. Their ancestor Babar founded a vast Empire in India which

rivalled in prosperity and splendour the great Caliphates of Abbasids and Omayyads in Spain. Delhi their metropolis, along with Baghdad and Constantinople, Cairo and Cordova was considered one of the finest cities of the known world. The Mughals who are well-known for their pomp and pageantry have raised some of the most magnificent architectural monuments in the East. Delhi houses the splendid *Jamma Masjid* (Grand Mosque), the Majestic Red Fort and the matchless Pearl Mosque, all built by the Mughal Emperor Shah Jahan. He is also the distinguished builder of the immortal Taj Mahal of Agra. In Lahore stands the magnificent *Badshahi Masjid* (King's Mosque) built by the celebrated emperor Aurangzeb. Dacca which had the privilege of being the headquarter of the Mughal viceroy governing the Eastern Provinces possesses some striking Mughal buildings.

The earliest contacts of the Mughals with the Eastern province may be traced back to the close of the 16th century A.D., when Afghans who dominated over these parts yielded to the Mughals and they established their headquarters at Tanda near Gaur, about 15 miles South-west of Malda in West Bengal. It was in 1612 A.D., that the Mughals got complete supremacy over Bengal and Islam Khan, the Mughal governor transferred his Capital to Dacca. This caused a great change in the life of Bengal and added immensely to the prosperity of the people.

The oldest Mughal monument in Bengal is a ruined mosque erected in 1582. A.D. in Chatmohar,

District Pabna. It contains three arched entrances, which still exist. The central arch has traces of having been richly decorated with ornamental designs.

Another monument of the same period is a mud fort constructed in 1595, A.D. by Raja Man Singh, the Bengal Governor of the Mughal Emperor Akbar at Salim Nagar, in Bogra District.

The best massive monument of this period is a mosque known as *Kherua Masjid* which is situated at a short distance from the Tomb of Saint Bande Saheb. This mosque, which was built in 1582 A.D. by Murad Khan Qasshaly, measures $57 \times 24\frac{1}{2}$, and has 6 feet thick walls. The mosque is rectangular in shape and the central gateway contains an inscription. The arches are decorated with floral designs which greatly contribute to their charm.

Later Mughal Monuments

Dacca which was the headquarter of the Mughal viceroys possesses some of the finest Mughal architectures in East Pakistan. Shaista Khan, the maternal uncle of the great Mughal Emperor Aurangzeb and Prince Muhammad Azam, the third son of the celebrated emperor who were successive viceroys in the Eastern Provinces of the Mughal Empire were the two persons credited with enriching East Pakistan with grand Mughal monuments rarely visible in these parts of the sub-continent. It is futile to compare the Mughal architectural monuments of Dacca with those of Delhi, Agra and Lahore which for long periods,

had the privilege of being the metropolis of the great Mughal Empire. Being a Provincial Capital, Dacca may favourably be compared with any other Provincial Capital and to that extent it possesses more than its share of Mughal monuments. Bogra and Mymensing, too, possess a few buildings built by the Mughals.

Old Idgah

The remains of the old Idgah, built by Mir Abul Qasim, the Dewan of Prince Shuja in 1640 A.D., still stands about $1\frac{1}{2}$ miles outside Dacca municipal limits. The building is of plastered brickwork, standing on a raised platform $245 \times 135'$ in size.

The remains of Bara Katra built of plastered brickwork in 1644 by Mir Abul Qasim on the north bank of the river, are still visible and remind people of the commercial prosperity of Mughal times. It had 22 big shops and was also used as a *caravansarai*. Its three storeyed lofty gateway and the river side walls which are 200 feet long, have faced the ravages of time. The chamber of the main gate as well as the interior of the arches are ornamented with plaster net-work and floral designs which are preserved in a dilapidated state.

Lall Bagh Fort

On the Eastern corner of old Dacca stand the remains of the incomplete Lall Bagh Fort or Fort Aurangabad, whose construction was commenced by Prince Muhammad Azam, the third son of Emperor Aurangzeb, but could not be completed as the Prince

was summoned by his illustrious father in 1679 A.D. to join his forces against the Marahttas. The finished part of the fort contains two main gates on the north and south in a 2,000 feet long massive walls. The fort was built of red bricks. The river Buri Ganga, which, in those days, washed the south western corner of this majestic fort, has slightly changed its course, leaving a track of land which has been converted into meadows. The bastion adjacent to the main gateway is of gigantic size and has a raised platform 13 feet wide for the stationing of guns. The stately three storeyed gate on the south, with a four centred arch-way built of stone and crowned with a plastered dome, is the most attractive part of the building. Adequate protective measures were taken in the construction of the building against river Piracy.

Pari Bibi's Tomb

The Tomb of Pari Bibi, standing amid the unfinished Lall Bagh fort is like a lotus flower in a big pond. It is the mausoleum of Bibi Pari (Lady Fairy), the favourite daughter of Shaista Khan. The Mughal Viceroy Shaista Khan whose sister Mumtaz Mahal has been buried in the immortal Taj Mahal, the finest mausoleum ever built on the surface of the earth, raised another matchless Tomb for his beloved daughter Pari Bibi. Built of black, grey and white marble stones brought from Bihar, U.P. and Rajputana, this mausoleum is the finest specimen of Mughal architecture in the Eastern Provinces. The walls and the floor of the burial chamber are made of white marble lined with black. The walls of the four cornered rooms pre-

viously had multi-coloured glazed tiles and were decorated with floral designs, which now are missing. The 'series of corbelled roof', with its excellent timber work is the most striking portion of the building. The grave which is made of white marble in three steps, presents a simple but sober specimen of the arabesque. The doors were originally of carved sandal wood.

Domed Mosque

Prince Muhammad Azam built in 1678 A.D. a small three domed mosque which is located about 50 yards west of the tomb of Pari Bibi. The walls of the mosque are coated with coloured plasters. Another small mosque and an adjacent tomb built in 1679 A.D. by Haji Khwaja Shahbaz, a business magnate of Dacca are situated at a distance of about half a mile from old Dacca. The walls, which are made of bricks are panelled. The tomb is square in shape, having four central gates, one on each side. This tomb 'represents the average Bengali style of the time of Aurangzeb'.

Red Mosque

A red brick mosque built by Khan Muhammad Mirdha in 1706 A.D., stands North-west of the Lall Bagh fort. Another mosque, which is said to have been built by Shaista Khan in 1689 A.D. stands majestically on a low rock near Jafarabad, about two miles outside Dacca. A lot of ornamentation and floral designs, though in decayed form, are still visible inside the mosque.

Brick Fort

Idrakpur, a place at a distance of about 15 miles from Dacca still contains the dilapidated remains of a small brick fort built in 1660 A.D. by Mir Jumla, the invincible General of Emperor Aurangzeb, who was posted as the Governor of Bengal. It was constructed to provide a check to Portuguese pirates, who had become a nuisance in that part of the Mughal Empire. The fort is 270 feet × 240 feet, containing a long high platform used probably for mounting the big guns. Two other small forts were also built side by side for similar purposes and throw light on the coastal defence measures taken during the 17th century A. D.

Brick Bridge

Mir Jumla is also known to have built a plastered brick bridge over a tributary of the Bari Ganga in 1659—63 A.D. about 5 miles south-east of Dacca. On each side of both ends of the bridge are small projected pavilions. Considering the limitations of engineering during the 17th century, this bridge may be cited as an excellent example of workmanship in these parts of the sub-continent. Besides those in Dacca, there are a number of Mughal architectural monuments scattered in other districts of East Pakistan which include the Tomb of Banda Sahib and Polar Masjid in district Bogra; the mosques of Shah Muhammad and Aurangzeb in district Mymensing; and the mosque built by Govind Manikya at Shuja Ganj in district Comilla. All of these bear the characteristics of later Mughal architectural style.

FINE AND MINOR ARTS

Arab Calligraphy

The Arabic script stands second only to Roman script in the world. It is a script which prevails throughout the Islamic world extending from Morocco in the west to Indonesia in the East.

With the advancement of Arabic culture, greater refinements of taste in almost all walks of life including calligraphy was noticed in Arabia and other Muslim countries where Arabic script was adopted as the national script. The Arabic calligarphy both in beauty and variety was also influenced by local conditions and a few celebrated calligraphers wrote as many as fifty different Arabic scripts. The earliest monuments of Arabic writings are the trilingual (Greek, Syraic and Arabic) inscriptions of Zebed dated 512 A.D. and the bilingual (Greek and Arabic) inscription of the Harran in the Ledja dating 568 A.D.

During the early period of Islam, the principal material written on was leather. Besides this palm leaves, camel bones, flat white stones, wooden tables and parchments were also used for writing purposes.

The origin of Arabic script has not been established; some think it to be a developed form of stiff angular script called *kufi* by the Arabs. Balazuri



The exquisitely hand-written Quran and the sacred ornaments—the vase, tripodal urn and incense container—in the Mosque at Tung Sze Pailou, Peking.



A specimen of the caligraphy over Jinili Keoshk done in mosaic tiles (XVth century) Istanbul.

and many others hold it to have been invented in the state of Lakhmids. Ibn Khaldun and Ibn Khalikan corroborate this view and maintain that 'Art of writing spread from *Hira* or *Anbar*'. The Arabic script replaced the prevailing script of the countries conquered by the Arabs—Arabic replaced Syraic in Iraq, Syria and Palestine; Pahlevi script in Persia; Coptic and Greek scripts in Egypt and primitive Berber script in North Africa.

The period of the Abbasid Caliphate is the golden era of Islamic culture, distinguished for the great advancement of Arabic sciences and arts. The Arab calligraphy, too, received great impetus during the Abbasids reign. Hitherto Arab calligraphists concentrated in the writing of the Quran and on monuments of stone, but now greater refinement and variety was visible in the work of Arab calligraphists. Greater attention was now paid to the artistic development of Arab calligraphy. During and before the Abbasid rule a script called *Khutut* existed which was used for the writing of the Quran and for profane literature. During the Abbasid Caliphate a number of outstanding calligraphists existed. One of them was Ali Bin Ubaida al-Rihani who invented *Rihani* script. He was also a prolific writer who lived under Mamum and died in 834 A.D. The others were Wazir Ibn Mukla (885—940 A.D.) and his brother Abu Abd Allah Al-Hassan (881—942 or 950 A.D.). No reliable specimen of their art is available except an alleged autograph of Mukla preserved in the Khedivial Library. These last two calligraphists are taken to be the reformers of written script. Ibn Khaldun holds

that *kufic* characters were changed by Mukla into the present type of script.

Ibn al-Bawwab who died in 1022 or 1032 A.D. was a celebrated Arab calligrapher called 'Ibn al-Sitri-' He wrote 64 copies of the Quran. One of them was written in *Rihani* script which is preserved in the Laleli Mosque of Istanbul to which it was given by Sultan Salim I. The *Diwan* of the pre-Islamic poet Salma bin Jandal copied by him in a beautiful hand was placed in the library of Aba Sufya. He improved *Rihani* script and invented *Muhaqqiq* script. He started a school of calligraphy at Baghdad which lasted upto the time of Yaqut al-Mustasimi.

Yakut al-Mustasimi, the court calligrapher of Al-Mustasim Billah, the last Caliph among the Abbasids acquired great fame. A script called *Yakuti* derived its name from him. The two Qurans written by him in 1290 and 1291 are still extant and exhibit the stiff *Naskhi* of the later Persian period. Yaqut's signature is written in a kind of *Suls.* According to a western critic, "He owes his fame more to fashion than to anything else".

On the decline of the Abbasid Caliphate, the centre of Arab culture shifted to Egypt, the largest Muslim country where the Fatimids had formed their Caliphate. During the first half of the 6th century Hijrah, the round script was greatly developed and used in books by Arab calligraphers in Egypt. Under the Ayyubid dynasty of Egypt it was mostly used on stone monuments, e.g. Saladin's incriptions on the arch and *minbar* of the Mosque Aqsa in Jerusalem.

During Mamluk rule of Egypt very beautiful designs of round Arabic script were developed by calligraphers and specimens are found in Qurans written for the Sultan and Amirs of Egypt of that period.

During the rule of the Abbasid, Fatimid and other Egyptian dynasties much attention was paid both by government departments and by private individuals to calligraphy. Kalkashandi in the second volume of his great work enumerates 6 different types of official scripts:—

(1) Al-*Tumar al-Kamil* (in several variations, used for official correspondence of monarchs).

(2) *Mukhtasar al-Tumar* (in two variations—*al-Muhakkak* and *al-Thulth*).

(3) *Al-Thulth* (in two forms—al *Thaqil* and *Al-Khafif*).

(4) *Al-Tawki* (in three forms).

(5) *Al-Rika* (in three forms).

(6) *Al-Ghubar* (in one form).

During the Mamluk period, stone monuments exhibited graceful script—the letters of which were more elegant and slender than any produced up to that period.

After the fall of the Mamluks, the Ottoman Turks too patronised Arabic calligraphy and much attention was paid to it both officially and privately. As late as the XI century A. H. more than 30 different scripts were known. The celebrated Turkish calligraphers

who left behind immortal specimens of Arabic calligraphy were Hamd Allah (died 1530 A.D.) and Hafiz Othman (Usman) who died in 1698—99 A.D.

Arabic calligraphy declined in Arab countries after the 14th century A.D., but it became more refined and artistic in Muslim countries, especially Persia where Arabic script was adopted and verses of the Quran were frequently written in different forms. The Persians developed Arabic calligraphy to a high degree of perfection. The famous calligraphist Muhammad Rawandi called Najmuddin Abu Bakr Muhammad born at Rawand near Kashan could write seventy different scripts. Another famous calligrapher Muhammad Husain Tabrizi who received the title of *Mihin* (greatest) Ustad, has left behind numerous examples of the art of calligraphy. His masterpiece was the inscriptions on the Mosque and *Khanqah* (sanctuary) of Tabriz which was destroyed in an earthquake.

Arabic calligraphy was developed in different centres where Arabs had settled namely North Africa, Spain, Morocco and Timbuktoo (Nigeria). The Arabic script was modified according to local conditions and was named after local places. In North Africa it was called *Maghrabi* (western) in Spain it was called *Andalusian* in Morocco it was called *Fasi*.

Rare specimen of Arabic calligraphy are still to be seen in the big cities of Islamic world. Greater and greater grace is being added to it.

Minor Arts

During the regimes of the pious Caliphs who led simple lives like ordinary mortals and had no palaces, or decorations, the arts could make little headway. But soon thereafter, during the Omayyad Caliphate when Caliphs preferred a life of pomp and pageantry the minor arts received unprecedented encouragement and Muslim artisans became pioneers in the sphere of minor arts too. The Abbasids who were greatly influenced by Persian culture, built grand palaces and distinguished themselves as great patrons of arts and learning. The other countries where Muslim minor arts flourished were Muslim Spain, Persia and Mughal India. 'Islam was the direct heir to many ancient craft traditions unknown to the west", writes A. H. Christie in the *Legacy of Islam.* "In much the same way that Muslim scholars transmitted to posterity a large fund of ancient learning, Muslim artisans preserved, developed and spread abroad the traditional workshop practice of arts in the orient, which had either never penetrated Europe, or, if known there in former times, had decayed during the period of storm and stress that ushered in the middle ages".[1] Islamic art had its beginnings in the mosque. The early mosques were simple constructions without any decorations. But soon mosques were refined and *mahrab* and *minbar* were added to them. Decorations in architectral design and furniture were provided in the mosques. The contact of Arab conquerors with the more cultured conquered nations of Persia and

[1]Legacy of Islam, pages 111—112.

Rome enlarged their vision regarding art and architecture which stimulated the development of art in Muslim countries.

The Muslims soon became great builders and produced skilful artisans. 'Their genius realised definite, architectural ideas with acute technical insight'. Their ideological objections to the presentation of human form, prevented the growth of painting and sculptures among them. But, on the other hand they showed great artistic taste and ingenuity in the ornamentation and design of natural objects which surpassed all presentations of their predecessors. The Muslim artists, artisans and craftsmen soon acquired such a reputation that their products were keenly sought in the Royal houses of distant Europe. "The most casual survey of Islamic art will show that ornamental designs must be ranked as the outstanding minor art evolved by Muslim genius", writes a western writer. In place of artistic decoration through presentation of human images in colour or mortar, Muslims evolved another feature of ornamentation by the use of Arabic inscriptions, passages from the Holy Quran and the name as well as date of death were artistically inscribed on the graves of important people. The Arab Calligraphists showed great ingenuity in the artistic renderings of Arabic letters on stones, paper and wood which immensely popularised this art in Islamic countries. Later, during the closing period of the Abbasid Caliphate and the Mughal Empire of India, passages from the Holy Quran and verses of Persian poets were artistically inscribed on the walls of tombs and

mosques. The front arch of the famous Taj Mahal of Agra presents an unique specimen of an artistic inscription from the Holy Quran.

Pottery made of clay and glass were developed to a high standard of perfection in Muslim countries. The chief beauty of high class pottery manufactured in Islamic countries lay in the floral designs, neat finish, riot of colours and glazed surface. China had been the workshop of high class pottery long before the advent of Islam, but after the 9th century A.D., Muslim potters rivalled and even excelled their Chinese counterparts. According to western writers, 'blue and white' colours were used for pottery in China, but the typical blue was an innovation of Muslim potters and even in China it was known as 'Muhammadan Blue'. This colour was superbly used on certain wares made at Kutahia (Asia Minor) during the 15th and 16th centuries A.D.

As regards artisanship, Muslim pottery occupies an outstanding place. The Muslim potters exhibited great originality by inventing new designs. The excavations carried on by archaeologists in Muslim countries have revealed high class glazed pottery in the ruins of Fustat (old Cairo), Samarra (old Baghdad) and Rayy. In the field of lustre or glazed pottery Muslims achieved great success. Pieces of such wares of different varieties used during the 10th century A.D. have been found in North Africa and Spain. Fustat (old Cairo) was a great centre of pottery making from the 9th century to the 11th century A.D. and the famous Persian traveller Nassir Khusrau has described in detail the wares used there during the 9th century A.D.

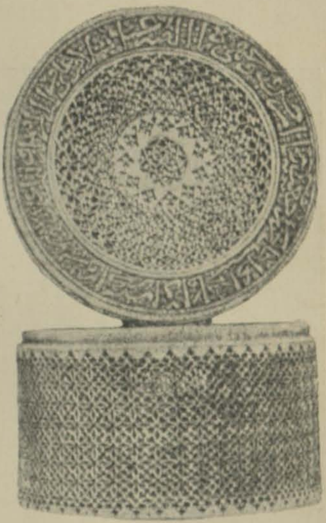
During the regime of the Abbasids, art and architecture registered phenomenal progress. The excavations at Samarra have brought out exceptionally high class wares used by the Abbasids.

This pottery bears even the date of manufacture and hence is of much historical value. Sa'ad was the most skilled potter who signed his wares. Egypt did not lag behind and lustre painting was an innovation of Egyptian potters. The material used in Egypt was different from the pink and yellowish Baghdad clay.

The Spanish Muslims, too, developed this handicraft to a high degree and created a new tradition known as Hispano-Moresque. Valencia was the centre of painted pottery and specialised in the manufacture of drug-jars. The Italians later successfully emulated Spanish lustre pottery. Toledo and Cordova and Malaga made exquisite pottery. The Iranian wares like those of Egypt, were made of a hard white paste with transparent alkaline glaze. But these were of finer quality. Iran which has been the cradle of Islamic culture introduced ornamentation in pottery. Sultanabad in Persia was the manufacturing centre of a special type of dark blue and black wares during the 13th and 14th centuries. Rayy was a great centre of the ceramic industry and made typical miniature wares. The craftsmen in Rayy introduced several novelties. Abul Qasim, a member of a distinguished family of Iranian potters had written a treatise in 1301 A.D. on the technique of pottery making adopted by the Saljuq Turk potters. The manuscript of this treatise is avail-



CARVED IVORY CASKET
Cordova. Dated 964.



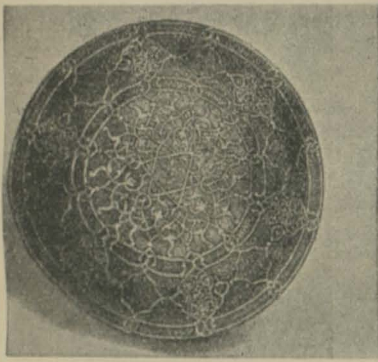
PIERCED IVORY BOX
Cairo. XIVth century.



CARVED IVORY CASKET
Cordova. Dated 1005.



CARVED ROCK-CRYSTAL EWER
Fatimid. Xth century.



BRASS BOWL-COVER
Inlaid with silver. Persia.
Early XVIth century.



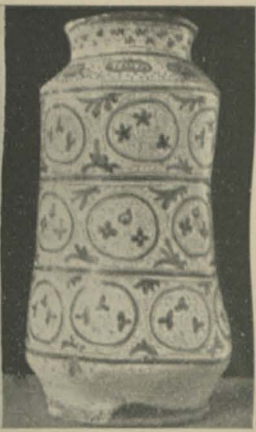
EARTHENWARE CUP
Painted in colours and gold.
Ray. XIIIth century.



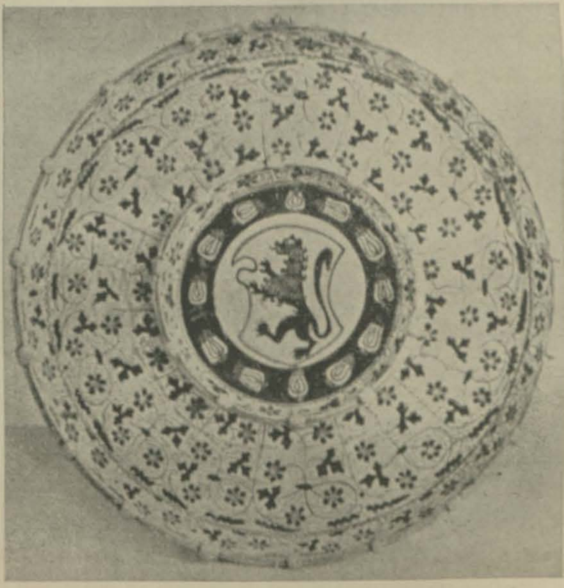
EARTHENWARE VASE PAINTED IN LUSTRE
Fatimid. XIth century.



EARTHENWARE DRUG-JAR
Painted in colours. Sultanabad.
XIIIth or XIVth century.



EARTHENWARE
DRUG-JAR
Faenza. XVth century.



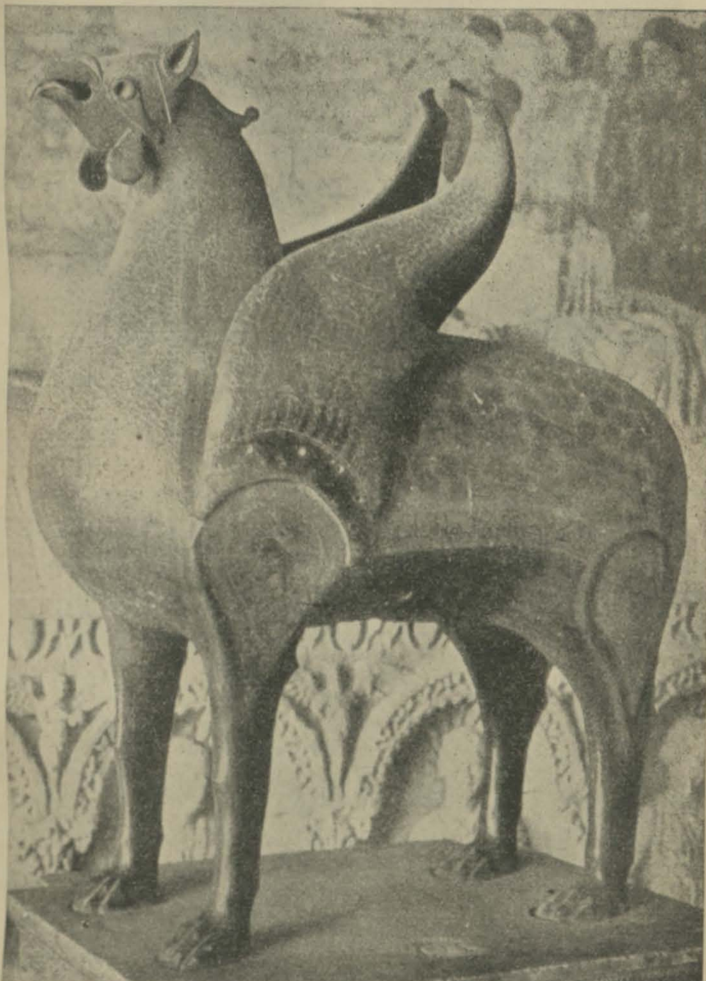
EARTHENWARE DISH. Painted in yellow lustre and blue.
Valencia. XVth century.

able in the Museum of Istanbul. The Saljuq wares are known for their glaze, wealth of bright colour and hardness. The floral designs were commonly used in the pottery made in Damascus and Persia. But the Persian wares of this type were exceptionally graceful. The chief characteristic of pottery made in Asia Minor was its red colour, which was conspicuous by its absence in Syria.

The gold and silver works of the period of early Islam are non-extant. The earliest extant silver work of Islam is a casket in the cathedral of Gerona which is 'made of wood sheathed with silver-gilt plating heavily patterned in response with scrolling foliation'. This casket was made by two craftsmen Badr and Tarif for a courtier of Al-Hakam II (961—76 A.D.) the Omayyad ruler of Spain. The Muslim goldsmiths and craftsmen had excelled in metal work. They introduced several novelties in engraving, caring and floral designs. "Other ways of decorating metals besides raising patterns in relief or engraving them were practised by the Muslim craftsmen. They excelled in the art of inlaying designs in gold and silver, in bronze and brass; a process performed in several ways, known as 'damascening'.... In the 15th century the oriental trade established by Italian cities during the Crusades flourished exceedingly. Eastern products became popular in the splendid pageantry of the petty Italian princes, whose workmen adopted them as models and began to emulate their triumphs. In Venice Muslim metal work inspired native craftsmen so profoundly that a distinct Venetian-oriental school

arose in which Muslim technique and designs were adapted to the renaissance taste".[1] The Royal palaces in Muslim states bore metal wares of exceptional beauty and designs. The famous Muslim historian al-Maqrizi gives a long list of heirlooms hoarded in the palaces of the Fatimid Caliphs of Egypt which include vases for narcissus flowers and violets, golden birds and trees set with precious stones. The Persian traveller Nassir Khusrau who had a chance to see the Fatimid Palace in 1047 describes a throne kept in the 12th room which bore excellent metal work and was decorated with scenes of a chase. This had a wonderful golden trellis. Among the Abbasid Palaces of Baghdad was one named *Dar-us-Shajar*. It contained a tree in the middle of a tank made entirely of gold, with birds perched on its branches made also of gold and studded with precious stones. The Peacock Throne of Shah Jahan was of exquisite artistic beauty. It was made of gold set with precious stones. The bronze, brass and copper works of the early Islamic period are extant. One of these is a huge bronze Griffin which stands in Pisa (Italy) which was probably brought from the Fatimid Palace of the 11th century A.D. The inlaid metal work in Muslim countries reached its peak during the 12th century A.D. and Muslim craftsmen were considered by all to be the masters of this art. A specimen of this period is a brass ewer kept in the British Museum. A large number of metal wares and articles with inlaid work made for decorative purposes were introduced by Muslim craftsmen during the 13th and 14th centuries

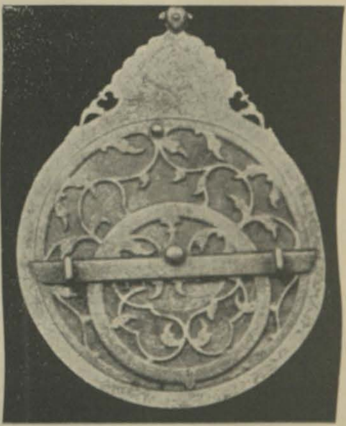
[1] Legacy of Islam, pages 117—20.



BRONZE GRIFFIN IN THE CAMPO SANTO, PISA
Fatimid, XIth century.



ASTROLABE
Toledo. Dated 1066-7.



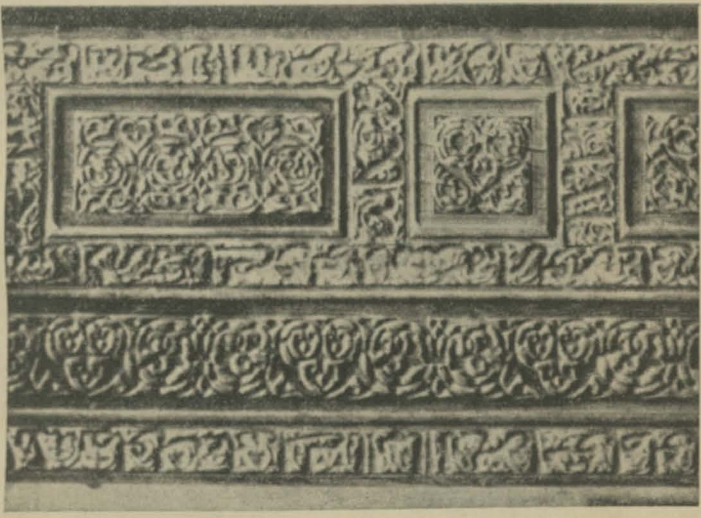
ASTROLABE
Persian. Dated 1715.



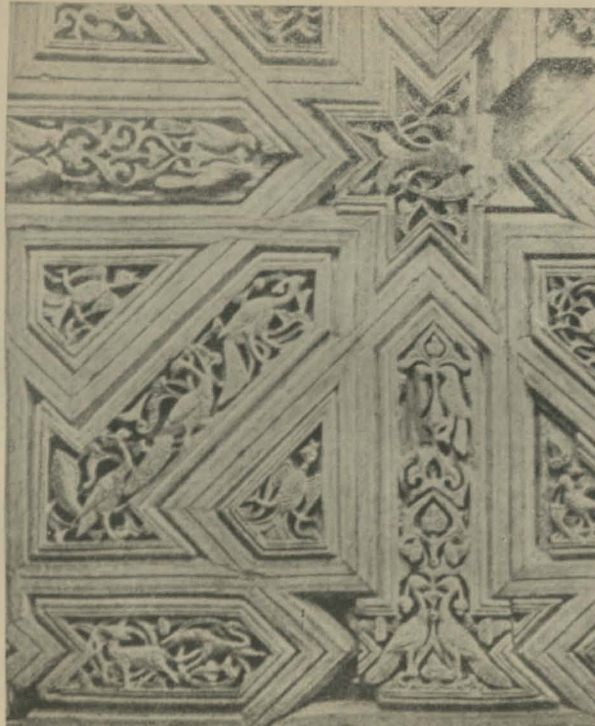
SILVER-GILT CASKET
Cordova. Xth century.



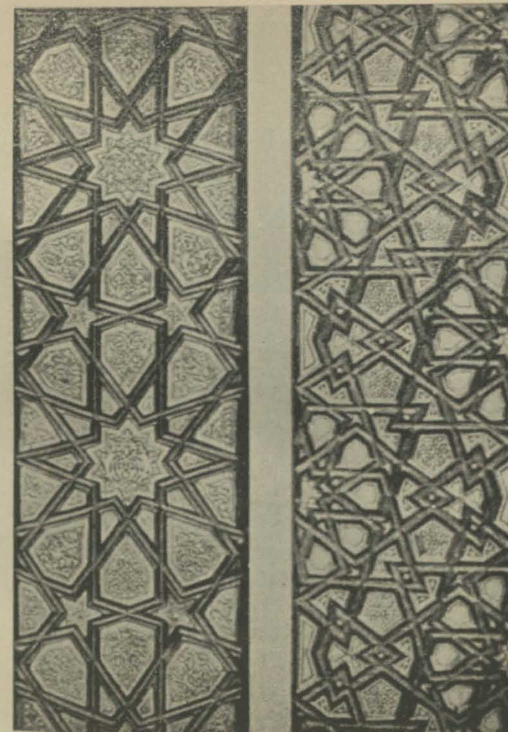
MARBLE FOUNTAIN-BASIN
Syrian. Dated 1277-8.



CARVED WOODEN PANELLING FROM A TOMB AT CAIRO
Dated 1216.



CARVED WOODEN CEILING
XIth century.



DOOR-LEAVES PANELLED WITH CARVED AND INLAID IVORY. Cairo. XVth century.

A.D. New designs were invented day after day which could satisfy the refined tastes of cultured and wealthy Muslims. The Persian craftsmen during these centuries introduced greater refinements in their metal wares compared to Mughal and Egyptian ones. But the devastation, wrought by Mongol hordes in Baghdad, Syria, Persia and Turkistan struck a death blow to the pursuits of arts and scattered their art treasures as well as their artisans.

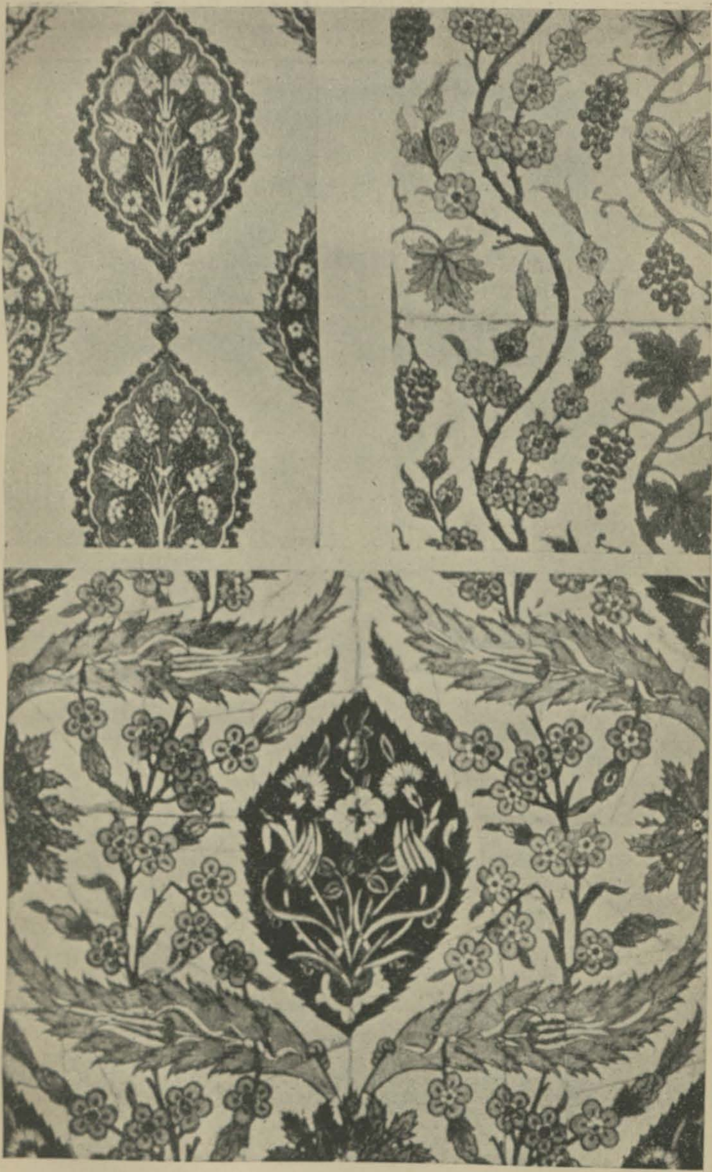
In wood and ivory works too, Muslim artisans excelled during mediaeval times and introduced several novel features. Floral designs and engraving of letters in wood and ivory works were common features. Several decorative devices in wood wares were used which included assembling of small panels, floral designs, engraving of letters and making figures of birds and animals. Mudejar craftsmen excelled in woodwork, textiles and pottery.

Ivory work, too, was highly developed in Muslim countries. Cordova, the capital of Muslim Spain was a great centre of ivory work and in the 10th century A. D. it housed a school of ivory carving, which produced beautiful things of ivory including caskets, toilet, perfume and jewellery boxes, with paintings, representing musical performances and hunting scenes. One of the finest examples of this work is a cylindrical casket kept in the Museo Arque-logico at Madrid which was made in 964 A.D. and was presented as a gift by the Caliph Al-Hakam II to his wife. Another superb example of Muslim ivory work is a remarkable rock crystal ewer in the treasury of

Saint Marks, Venice, which bears the name of the Fatimid Caliph, Al-Aziz. "The Arabs in Spain", writes Philip K. Hitti, "carried on almost all the minor and practical arts developed by Muslims in other lands. In metal work involving decoration, raising patterns in relief or engraving them, inlaying with gold and silver and inscribing characters, the Hispano-Moresque School excelled....In the 15th century we find imitations of this Muslim pottery produced as far North as Holland. From Spain the industry was meanwhile introduced into Italy. Its influence is noticeable in the later Spanish vessels, with their pseudo-Arabic inscriptions and Christian heraldic devices. In other forms of ceramics, as well as mosaics, especially tile and blue faince, the Spanish Muslim school distinguished itself. The various kinds of coloured tiles still favourites in Spain and Portugal are a legacy from the Arabs, as the name *azulejo*, suggests"[1].

Decorative tiles were used in the walls and floor of buildings in Asia Minor and Syria. During the 16th century A.D. some of the large buildings in Constantinople and Brussa (Ottoman Turkey) had their wells gleaming with beautiful tiles with black outlines and coloured in green, blue and red. The Syrian tiles, on the other hand had floral designs and were distinguished from Turkish tiles. The Kashani tiles which were introduced into Syria from Persia were much preferred for the interior decoration of buildings.

[1]History of the Arabs, pages 591—92



EARTHENWARE TILES PAINTED IN COLOURS
Asia Minor. XVIth century.



PANEL OF PAINTED EARTHENWARE TILES
Damascus. XVIth century.

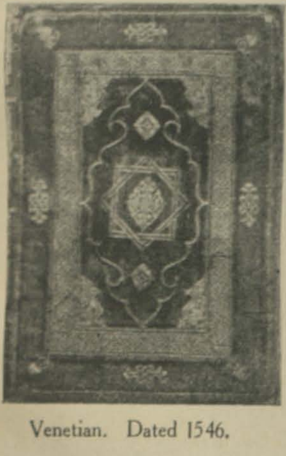
LEATHER BOOK-COVERS



Persian. XVIIth century.



Venetian. XVIth century.



Venetian. Dated 1546.



German. c. 1583.



INSIDE OF LEATHER BOOK-COVER
Cairo. Late XIVth or early XVth Century.

The glass industry thrived in Syria where material for glass manufacture was found in abundance. All sorts of glass wares were manufactured in the Syrian towns of Antioch, Alleppo and Damascus. The process of enamelling and gilding glass was perfected by the craftsmen of Tyres. The Spanish manufactured glass was inferior to that of Syria. The Syrian glass was highly priced in Mediaeval Europe. The Syrian glass wares included lamps, lamp shades and vessels of exceptionally beautiful designs. The Museums of Louvre, London and Cairo contain exquisite pieces of pottery, glass and metal wares excavated from the ruins of Fustat and Samarra.

The Egyptian and Spanish binders excelled in leather binding which was later introduced and copied in Europe. The Persians had specialised in the industry of carpet weaving since the days of early Islam. Even during the present day Persian carpets are considered to be the finest in the world. Hunting and garden scenes were favoured in rug designs. Thus minor arts were developed to a high degree of perfection in Muslim countries during mediaeval times. The wares manufactured in Muslim countries were in great demand all over the civilized world. Writing in *Legacy of Islam*, A. H. Christie admits, "For more than a thousand years Europe has looked upon Islamic art as a thing of wonder; at first largely because it was closely associated with lands deemed the Christian heritage, but later solely by reason of its own intrinsic beauty....With the Crusades a new era opened. The half fabulous magnificence traditionally

ascribed to the Saracens became a reality to astonished Christendom. A host drawn from every part of Europe came suddenly into close contact with a social order that in every respect outraged the narrow limits of their experience. In every activity of life the reactions of this impact with alien progress soon became apparent, and in art its results were by no means the least far reaching. As time went on Italian merchants established direct traffic with Syrian ports, oriental trade became regularly organised and all kinds of rare things from Islamic workshops arrived in European markets. These imports met new-found needs, aroused emulation wherever they went, and opened up lines of development either immediately or in subtle ways destined to mature in the future".[1]

[1]Legacy of Islam, pages 147—49

MUSLIM SOCIAL ORDER—I

Justice in Early Islam

Islam, a religion based on democratic and socialist principles has laid great emphasis on the equality and brotherhood of man, which could not be achieved without imparting equitable and impartial justice to all. The Great Prophet of Islam has from the very beginning, stressed this vital moral aspect and the high standard attained in the administration and application of justice during the early Islamic period, effaced from memory the proverbial justice of Nausherwan.

Even before the advent of Islam, a practice known as *Half-al-fudul* (the oath of voluntary justice) was prevalent among the Arabs, in which the chivalrous volunteers of the order sided with the oppressed even at the risk of their lives, and were not contented until full justice was done. This organization which was a terror for the criminals and the tyrants continued functioning upto the Omayyad Caliphate. Other methods of obtaining redress in pre-Islamic Arabia were (1) through local tribunal composed of tribal elders from which there was no appeal. (2) through *Kahins* (Soothsayers) from which there was no appeal, an institution similar to that of the Oracle of Delphi (Greek) (3) through arbitration by notable chieftains. This was the most important method

of deciding complicated cases and inter-tribal feuds. The Chieftains of Bani Tamim, acted for generations as arbitrators for the whole of Arabia. During the early Islamic days, the Prophet who was noted for his piety, honesty and integrity throughout Arabia, served as the supreme judge for Muslims. The highest appeal lay with him and his judgment was considered as final in all controversial matters. On his migration from Mecca to Madina he laid down certain rules and regulations for the guidance of the *Muhajreen* and *Ansar* which may be taken as the basis of the constitution of the first Islamic State. After mentioning the confederal units of the *Muhajirs* and *Ansars* in the preliminary chapters, he deals with the importance of maintaining high standards of justice in an Islamic State. The Prophet appointed a special Court of Law when both parties were Jews and such cases were decided according to the rules laid down in the Taurat. According to Kara-lev Skij, during the Caliphate of Hazrat Abu Bakr such courts were established to decide cases between non-Muslims.

The Prophet had nominated *Naqibs* and *Arifs* for the Muslims of Medina, even before his arrival there. *Naqibs* who represented 12 tribes, were responsible for maintaining peace and order in their area. *Arifs* worked under *Naqibs*. The final appeal in disputes lay with the Prophet, who was the supreme judge.

Muaz bin Jabal was appointed by the Prophet of Islam as the first Qazi to al-Janed in al-Yemen. Muaz had a farewell audience with the Prophet, which

occupies an important place in the history of Islamic jurisprudence. The Prophet enquired "How will you decide the cases?"

"I shall decide according to the Book of God", replied Muaz.

"And if there is nothing on the subject in the Book of God", asked the Prophet.

"Then according to the practice (*Sunnah*) of the Apostle of God", replied Muaz.

"And if there is nothing in the practice of the Apostle of God?" enquired the Prophet.

"Then I will use my own judgment", added Muaz.

Thereupon the Apostle of God said, "Praise be to God who enabled the envoy of the Apostle of God to say what has satisfied him (Prophet)".

In ancient Semitic laws, if a man killed the daughter or son of the other, his son or daughter was to be killed. But Islam changed this law and the Prophet of Islam differentiated between intentional and accidental murders and motive was made the determining factor in awarding punishments.

The revision of judgments was allowed and during the Caliphate of Hazrat Omar people were at liberty to complain against the highest authorities at the time of *Haj*, when people assembled in Mecca from distant corners of the Islamic world. Hazrat Omar

showed no softness toward the highest State official if he was found guilty, 'the higher the position the stricter and severer was Omar's scrutiny of his conduct'.

When Hazrat Ali was appointed judge of Yemen, the Prophet instructed him that he should not decide the case without taking the statements of both the parties. "The burden of proof", said the Prophet, "lies with the claimant and the defendant who denies the claim, must deny on oath". This principle of law is followed by all courts at the present time. Qazi Shurayh made an important amendment in the witness laws. Formerly all witnesses appeared together. He suggested that witnesses should appear separately before the Qazi. Qazi Shurayh who was appointed by Hazrat Omar as the supreme judge of Iraq imparted impartial justice for about 75 years and is reputed to have been one of the most brilliant legal luminaries of the Islamic world. The Prophet had appointed paid judges and Attab bin Asid, Qazi of Mecca who was paid 30 Dirhams per month was one of them. Hazrat Omar, the second Caliph of Islam fixed handsome salaries for the Qazis so that they might be free from temptations and corruption.

Jails, too, were constructed by Hazrat Abu Bakr and his successors. The first court building was constructed by Hazrat Osman, and was called *Darul Qada*.

The Head of the State in Islam was never considered above the law. The British conception that

the king can do no wrong, has never been accepted in Islam and legal action could be taken against the highest authorities. The Holy Prophet, himself, entertained claims made against him and personally appeared in several civil suits filed against him. It has been proved by historical records that such great Caliphs as Hazrat Omar and Ali as well as several autocratic Caliphs of the Omayyad and Abbasid dynasties were summoned into the courts of the Qazi and no regard for their exalted position was shown. On the contrary Hazrat Omar and Ali resented the ordinary respect if shown to them by the Qazi.

The administration of justice in Islam was made easy due to the sanctity attached to the law in Islam in addition to the sanction of the Government. According to Islam the principal law giver is the Almighty God who is Omniscient and Omnipresent. He delivers His commands and ordinances through His Apostle (Prophet) and the Holy Book (Quran). The sinner among Muslims has to take into consideration both the moral (Divine) and physical (Governmental) sanctions before committing a sin. The dread of punishment in this world and the hereafter keeps him away from sins and he thinks twice before committing them.

Application

The classical sermon given by the Prophet in his farewell pilgrimage in the 10 A. H., contains the fundamentals of Human Rights, when he said that the three elementary rights of man namely Life, Property

and Honour will be duly respected in Islam. The Prophet's judgment in various controversial matters, between tribe and tribe, Muslims and non-Muslims, forms the land-mark of the history of jurisprudence. He was equally relied upon by his friends and foes. Even his deadliest enemies the, Quraish of Mecca had given him the title of *al-Amin* (Trusted) and never questioned his integrity of character. He was kind and just even to his enemies.

Hazrat Abu Bakr Siddiq, the first Caliph of Islam kept up the noble traditions of his master and ensured impartial justice in his fast expanding Empire. Addressing the people after his election as the first Caliph of Islam he delivered a memorable speech: "Now I have been elected your Caliph, although I am no better than you. Co-operate with me if I am right; set me right if I go astray. Truth is a trust, falsehood is a treason. The weak among you shall be strong with me, till his right has been vindicated and the strong among you shall be weak with me, till I have taken what is due from him. Obey me as long as I obey God and His Prophet. When I disobey Him and His Prophet then obey me not". The principles enunciated above formed the sheet anchor of his justice. Hazrat Omar was appointed the Chief Qazi of his Caliphate, but people had grown so honest in their public dealings that not a single case was brought before him for one year. Zaid bin Sabit, Hazrat Ali, and Hazrat Osman acted as Honorary *Khatibs*. The Caliphate of Hazrat Omar forms the golden epoch of the administration of Islamic justice.

The second Caliph of Islam is particularly known for his impartial justice. Justice during his reign was administered by Qazis who were appointed by the Caliph and were free from the control of the Governors. He was the first man who separated the judiciary from the executive, thus ensuring free and impartial justice. "The judge was named and is still named", says Von Hammer, the *Hakim-us-Sharaa*, i.e., ruler through the law, for law rules through the utterance of justice, and the power of the Governor carries out the utterances of it. Thus the Islamic administration, even in its infancy, proclaims even in word and in deed the necessary separation between judicial and executive power".[1] Such separation of executive from the judiciary has not been attained by any of the most civilized states of modern times. The administration of justice during his time was perfectly impartial and the Caliph himself set an example by carrying out the orders of the Qazi.

The letter written by the second Caliph to Abu Musa Ashaari, detailing the fundamental principles of justice is an invaluable piece of jurisprudence which can favourably be compared with the Roman law. The Caliph took particular care to enforce the equality of justice. In the eyes of the law all are equals. He personally visited several courts in order to have practical experience of their working. Once he had to attend the court of Qazi Zaid Bin Sabit as a defendant. On the arrival of the Caliph in the court, the Qazi stood up as a mark of respect. Hazrat Omar objected

[1]As quoted by Ameer Ali in 'A Short History of Saracens, page 62.

to it saying that it was against the conventions of the court and took his seat by the side of the plaintiff. The case proceeded on and in the end the Caliph had to give his statement on oath, but the Qazi exempted him from doing so. Again the Just Caliph extremely resented this preferential treatment to his person and warned him, "Unless you consider an ordinary man and Omar as equals, you are not fit for the post of a Qazi".

Jablah bin Al-Aiham Ghassani was the ruler of a small State in Syria. He was converted to Islam and one day, when he was offering *Haj*, a part of his gown was trampled upon by a poor Arab. Jablah gave him a slap. The Arab, paid him back in the same coin. The infuriated Jablah hurried to the Caliph and wanted that the Arab should be severely dealt with. The Caliph told Jablah that he had already received justice. Thereupon Jablah added, "Had he done such an insult to me in my country, he would have been hanged". The Caliph replied calmly, "Such was the practice here in pre-Islamic days but now the pauper and the prince are equals before Islam".

Hazrat Omar was very strict in the enforcement of impartial justice and did not spare his near and dear ones if they were at fault. Once his own son Abu Shahma was reported to have drunk wine. The Caliph flogged his son with his own hands, till he died, and the remaining strips were delivered on his corpse. He awarded a similar punishment to his brother-in-law. The history of the world can hardly produce greater respect for justice.

Hazrat Ali was the greatest *Mujtahid* (Jurist) of early Islam. He solved the knotty problems and cases which defied solution. He was the principal adviser on religious, legal and constitutional matters during the reign of the first two Caliphs. Once two women were brought before him who were quarrelling over an infant child—each claiming it. Hazrat Ali ordered that the child should be cut into pieces. The real mother was overwhelmed with grief and renounced her claim. Hazrat Ali awarded the child to the real mother and punished the other woman.

When Hazrat Ali was Caliph, he was summoned to the court of a Qazi. A Jew had filed a suit against him and claimed the Caliph's armour. The Caliph called at the court and stood by the side of the claimant (Plaintiff) and did not tolerate any consideration for his exalted position. The claimant (Jew) produced several witnesses in support of his claim. The Qazi enquired from Hazrat Ali whether he had anything to say in his defence. The Caliph replied in the negative and the Qazi decided the case in favour of the Jew and awarded him the armour which the Caliph had actually purchased from him. The Jew was much struck with the impartial judgment of the Qazi and returned the armour to the Caliph, saying, that the Caliph had actually purchased the armour from him (Jew). He had filed the suit in order to test the impartiality of the Caliph and his court which magnificently stood the test. Hazrat Omar used to say about Hazrat Ali, "God forbid we may not be confronted with any controversial problem which Ali might not solve".

Hazrat Omar bin Abdul Aziz the Omayyad Caliph was known for his piety and justice. During his short Caliphate of $2\frac{1}{2}$ years, he re-orientated the administration of justice on a sound footing. Even the claim of an ordinary citizen was recognised against the most powerful members of the Omayyad dynasty. The proverb that the goats and wolves roamed about together had become true during his reign.

Imam Abu Hanifa was the greatest legal mind of Islam, but he declined to associate himself with the Omayyad and Abbasid Caliphates which had been converted into monarchies and he had to pay a high price for this refusal. Once the Abbasid Caliph Mansur offered him the high post of the Grand Qazi of his vast Empire. The Imam bluntly replied: "supposing a complaint is lodged against you in my court and you want that the case should be decided in your favour, otherwise you would throw me in the river. Then please rest assured that I would prefer to be drowned in the river rather than decide against justice". This out-spoken curt reply silenced the Caliph for the time being. But on another occasion, Mansur again offered this high post to the Imam. The Imam again refused the job saying that he was not fit for that. The Caliph shouted out, "You are a liar". The Imam replied calmly, "you have verified my contention. A liar is unfit for the post of a Qazi". The Caliph was nonplussed by this logical reply and swore that the Imam would have to accept the post of Grand Qazi. The Imam too swore that he would

not. The whole Durbar was stunned by the boldness of Imam.

The Imam was known for his great learning and legal brain throughout the Islamic world. The Caliph privately consulted him on controversial issues and his judgments were highly respected by all. Once there had been some dispute between the Abbasid Caliph Mansur and his wife Hurra Khatun. Khatun wanted the matter to be referred to Imam Abu Hanifa. The Imam was summoned by the Caliph and his wife also sat behind the curtain. The Caliph asked the Imam, "How many wives are allowed in Islam at a time"?

"Four", replied the Imam.

Mansur cried out to his wife, "Did you listen what the Imam has said"?

The Imam added at once, "But there is one condition. A man is permitted to marry more than one wife, provided he is capable of imparting justice and granting equal rights to all of his wives".

The last part of the Imam's reply went against the interests of the Caliph. On reaching home, in the evening, he found a man waiting for him with a bag of guineas and a letter of thanks from the wife of the Caliph. The Imam returned the money with a word that it was his duty to speak the truth without having any consideration for fear or favour.

Qazi Abu Yusuf, a pupil of Imam Abu Hanifa was appointed the Grand Qazi of the Abbasid Empire during the reign of the celebrated Harun-ar-Rashid. On several occasions he delivered judgments against the interests of Empress Zubaida, the favourite wife of the Caliph, without caring for the consequences.

Such was the high standard of justice maintained during the period of early Islam, which has hardly any parallel in the long history of jurisprudence.

SOCIAL ORDER—II

RIGHTS OF DEPENDENTS, RELATIONS AND NEIGHBOURS

Islam is a practical Religion. Its principles, social and economic, political and religious have been formulated on realistic and rational lines, which gave birth to a healthier society based on equality and brotherhood.

Like the Bible and the Taurat the entire ethical teachings of Islam may be summarised in the phrase "Love and service of humanity"—but this is not enough and Islam being a complete religion has given the details of this service mentioning the priorities to be given to individuals or groups in such a service. This order in the social system formulated by Islam is its greatest achievement which is unparalleled in the annals of various religions of the world. The social order of Islam is not guided by sentiment but by justice and has fully taken into consideration human psychology and nature. The great Prophet of Islam once said, "It is the height of faith that you should like for your brother whatever you like for yourself". This amply explains the duties and rights prescribed by Islam for various groups and individuals which is based on the relations and connections among them. Such a prescription of rights according to relationships is quite natural and does not lead to internal and

social conflicts which is too prevalent among members of other religions and which has led some of the religions, e.g., the Hindu religion to revise its social order and hereditary rights in accordance with the light shown by Islam. Recently the Hindu code has been revised and its hereditary system in which the women had no right has been formulated along the lines of the Islamic hereditary system. Islam while awarding rights has laid greater stress on their utility and relationships—one should prefer a man to an animal, a friend to a stranger, a relation to an acquaintance and amongst relations those who are nearest should be helped first. But it forbids uncalled for or illegal help even to one's dearest and nearest relations. Such a scientific classification of rights as formulated by Islam is non-existent in other religions of the world. Some religions like the Buddhist and the Hindu have kept man and animal in the same category in terms of help and treatment. The Jews and Christians have emphasised the respect due to parents, but are silent on the rights of other relations. Islam has given in detail the rights of various relations and has prepared a list of the recipients of rights giving priority to those who are closest. Such a division is psychological and is based on philosophy. If a man can help only one individual and has a poor sick mother, a poor sick relation, a poor sick neighbour—then he should naturally advance his help to his sick mother who is closest to him and this is what Islam says. Anything other than this would be cruelty and totally against nature. The Holy Quran in *sura Nisa* has laid down clear injuctions on the matter

when it says, "Be helpful to your mother, father, relations, orphans, destitutes, related neighbours, stranger neighbours, friends, travellers and slaves". The rights of various groups and individual as graded by the Holy Quran is natural and practical but almost all other religions of the world are silent on the matter.

Islam on the other hand preaches universal brotherhood and enjoins its followers to be kind to all of humanity and make the best use of the worldly things which have been created for them by discharging their duties to needy persons. According to the reliable *Hadith* of Bukhari the Holy Prophet once said, "The man who plants a tree is blessed when people and birds are benefitted with its fruits. A man was sent to Paradise, because he saved a thirsty dog from death by offering him water and the other was condemned because he tied and starved to death a cat". "The Muslims", says a *Hadith*, "are a single hand like a compact wall whose bricks support each other".[1] These ideas are found in every part of the law—both public and private.

Parents Rights

Of all the worldly beings, a mother should receive the greatest attention of her son and she tops the list of the recipients of rights in Islam. Even the Christian and Jewish religions have upheld and given the highest place to parents after God. "Paradise lies under the feet of your mother" says the Holy Prophet of Islam. The mother deserves the help and attention of her

[1]Seerat-un-Nabi, by Shibli Nomani and Sulaiman Nadvi.

children as it was she who nourished them with her blood. Islam has quite naturally given her the greatest right. The Holy Quran, in no less than 12 places enjoins upon the faithful to fulfil their duties toward their parents. Once in reply to a companion the Prophet said, "your mother has the greatest rights on your resources and then your father"—and he further said, "Disobedience to one's mother is against Islam". This superiority of parents is quite psychological, as, after God, man is most grateful to his mother for his physical birth, nourishment and early growth and to his father for his education and financial support. Islam says that the pleasure of God rests on the pleasure of parents and a faithful should try to please his parents by his obedience. The great Prophet Abraham prayed to God for the forgiveness of his father, though he was a non-believer (*Kafir*). Even a Muslim cannot go on Jihad (holy war) without the permission of his mother and once the Great Prophet asked a Muslim to serve his aged mother rather than go on holy war. The mother, after the death of her son is entitled to $\frac{1}{8}$ of the property left by her son.

Children's Rights

Next to parents, come the children in the matter of classification of Rights. Just as the parents have rights over their children, so the children too have some rights over their parents. Before the advent of Islam, hardly any rights of children over parents were recognised. Islam was first to formulate reasonable rules for the rights of dependents and relations—both hereditary and social. According to Tirmizi,

the Prophet once said, "Anyone who is not kind to his youngers and obedient to his elders is not from us". If the world had acted upon this golden rule, all the social conflicts would have disappeared long ago. The Arabs, before the advent of Islam killed their male issues because of poverty and buried alive their daughters in order to avoid the so-called humiliation of their marriage. The Hindus too sacrificed their children at the altar of the gods. Islam vehemently opposed such inhuman oppression of the sacred creations of God and recognised life as a birth right. The second right of the child in the social order of the world is its nourishment and early growth, which its parents should ungrudgingly provide for it. The child has a right to get the milk of its mother up to two years. The father should financially support his son and daughter till his or her maturity and also arrange for their proper education. Even the foster-mother and foster-brothers and sisters have been given substantial rights in Islam. The Holy Prophet of Islam showed great respect to his foster-mother Halima. The Holy Quran has enjoined upon the faithful to work for the cultural, moral, physical and spiritual development of their children in these immortal words, "O, faithfuls, you should save yourself as well as your children from the Fire". According to Islamic law a female issue is entitled to ½ of the hereditary rights of the male issue. The Hindu religion till lately recognised no hereditary rights for female members which led to great complications and conflicts and in a recent revision of the Hindu code the claim of female issues has been recognised on the lines of the Islamic system.

Matrimonial Rights

The third place in the graded list of Islamic rights is occupied by wife and husband. The household happiness entirely depends on the cordial relations between husband and wife. The wife is entitled to $\frac{1}{4}$ of the husband's properties after his death provided he leaves behind no issue. Almost all the leading religions of the world except Islam preach asceticism and abhor matrimonial life. The highest life prescribed by Buddhist, Hindu and Christian religions is that of renunciation of the world and these have no place for the rights of women especially for a wife in their social system. The wife, if any, should work for the comforts of her husband without demanding any privileges from him. The life of an orthodox Hindu wife is worse than that of the slave girls found in mediaeval times. Islam revolted against this inhuman treatment of the fair sex, and gave women their due right and place in society. Islam, quite naturally has acknowledged the superiority of husband over wife, as he is supposed to be her guardian and financial supporter. The wife is entitled to financial support from her husband, while her husband is entitled to all her love. Islam has divided the household life into two parts—the maintenance of internal household affairs is bestowed to woman, while the man is responsible for the management of outside works. Once the Holy Prophet of Islam proclaimed, "If I would have allowed the worship of any one other than that of God, I would have asked the wife to worship her husband". The wife can claim financial

help from her husband if she is not on good terms with him. She even can claim the charges of supplying milk to his infant child.

Relation's Rights

The fourth place in the list of rights is occupied by relatives among whom there are subdivisions—the nearest relations coming first. Of all the great religions of the world, Islam has given the greatest importance to the rights of relations, which is but natural and which if faithfully adhered to would have eliminated household and social conflicts from the world. Not less than 12 times the Holy Quran reminds the faithful of the rights of their needy relations. In *sura Rum* the Holy Quran says, "you should acknowledge the right of your relations". Once the Great Prophet of Islam declared, "one who is unmindful to the rights of his relations will hardly enter Paradise". 'Succour your brother, be he the aggressor or the aggrieved,' so said the Prophet. The Companions enquired 'as for the aggrieved, it is alright, and, how could they help the aggressor?'

'Stop him from aggression', came the immortal reply.

Neighbours Rights

Human beings are dependent upon one another in this world and the development of a healthy society is dependent upon the cordial relations of its members. Mutual help is the key-note of all good social orders. Islam, being a practical religion has laid great stress on the assistance of neighbours. A man is generally

harmed by his neighbours and if he has good relations with them, he is bound to lead a happy social life. Even before Islam, Arabs maintained good relations with their neighbours, but Islam with slight modification in its classification has enhanced the rights of neighbours. It does not behove a good Muslim to enjoy a good dinner if his neighbour is hungry. Addressing his companions once the great Prophet of Islam said, "The Muslim who has a true faith in God and the Day of Judgement will never oppress his neighbour". A Muslim must help his poor needy neighbour according to his capacities and it is the right of that neighbour to receive such help. Islam enjoins upon the Muslim women folk to send presents to their neighbours in the form of food, money and other things. The words of the Prophet had such a salutary effect upon his companions that all of them became the servants of their neighbours irrespective of caste and creed. "By the law of Islam" says Ameer Ali, "every individual is bound to contribute a certain part of substance towards the help and assistance of poorer neighbours. This portion is usually 2½% on the value of goods, chattels, emblements, on profits of trade, mercantile business, etc." Writing in the *Legacy of Islam*, David De Santillana says "The Prophet uttered some charming words with regard to neighbourly relations:—"Be kind to your neighbour. Draw the veil over him. Avoid injury. Look upon him with an eye of kindness. If you see him doing evil forgive him. If you see him doing good to you, proclaim your thankfulness".[1]

[1]Legacy of Islam, page 308.

ECONOMIC SYSTEM OF ISLAM

Islam, being a practical Religion has evolved a complete code of life which has successfully fulfilled the requirements of the changing times. Not only in the social but also in the economic field it has given an ideal lead to the people.

Of all the beneficial principles propounded by Islam, none are more useful for humanity at large than those governing income and expenditure. The main sources of income to the Islamic Exchequer are *Zakat*, *Ghanimah*, *Jizyah* (Tithe) and *Kharaj*. *Zakat* which literarlly means growth and purity is a tax on Muslim Capital owned beyond a certain minimum. *Zakat* occupies an important place amongst the (*Farz*) Fundamentals of Islam, the observance of which is binding on Muslims. It is an ordinance (*Farz*). According to the Holy Prophet of Islam (upon whom be peace), it was to be taken from the rich among them in order to be given to the poor. "This beneficial tax is called *Zakat*", writes Aghnides, in *Muhammadan Theories of Finance* "because of its giving lead to an increase of prosperity in this world and growth of religious merit in the Next".[1] The *Zakat* is a tax levied on capital goods" and is due when one is in "possession of full ownership of a productive *Nisab* (minimum) of property; and its rate is $2\frac{1}{2}\%$ of the value of possessions other than land". Tithe is a tax

[1]Muhammadan Theories of Finance, by Aghnides, page 203.

levied on the agricultural produce of the land. The Holy Quran enjoins upon the faithful to pay this tax in these words: "And on the day of its harvest give its Right" (VI : 142). The Prophet of Islam determines its rate as, 'In what has been irrigated with rainwater, one tenth and in what has been watered with buckets or water wheels, one half of the one tenth" (*Mishkat*). Both these taxes were charged from Muslims only. The *Zakat* (Growth Tax) is distinguished from the other taxes because it is spent exclusively on poor and needy persons. The Holy Quran states, "The charities are (exclusively) for the poor and needy, and those who collect it and those whose hearts are to be reconciled and to free the captives and debtors and for the cause of God—a duty imposed by God" (IX : 16). This tax has throughout the centuries contributed immensely to ameliorating the condition of the poor and has raised their standard of living by bringing them nearer to rich—economically and socially. This ideal tax which is levied on idle as well as productive wealth, discourages the accumulation of wealth and ensures its investment for productive and beneficial purposes. The Prophet once remarked, "Are there those among you who are the guardians of orphans who possess property? Then let them trade with it and not leave it uninvested. So that the *Zakat* Taxes due on it do not swallow it up" (*Al-Tirmizi*). The other sources of wealth obtained in abnormal times are *Ghanimah*, *Jizyah* and *Kharaj*. *Ghanimah* is the wealth obtained during the wars, one-fifth of which was deposited in the *Baitul Mal* (Public Exchequer). The *Jizyah* is a tax

levied on non-Muslims in lieu of military service which is compulsory for Muslims but not for non-Muslims. The amount of *Jizyah* is much less than the *Zakat* which is levied on Muslims only. The non-Muslims paying *Jizyah* were exempt from compulsory military service in a Muslim State but were entitled to full protection. The *Kharaj* is the annual levy paid by the conquered countries to the Muslims. The public coffers in which the wealth obtained through all these four sources was deposited was known as *Baitul Mal*. In the days of the Khulafa-i-Raashidin (Pious Caliphs) when the principles of Islam were strictly followed, the *Baitul Mal* played a vital role in building up the sound economy of the Muslims. Out of this Public Treasury were financed the needy, destitutes, orphans and other charitable institutions. It was due to this *Baitul Mal* that there could hardly be found any needy person among the Arabs, who before constituted one of the poorest nations in the world. The faithful adherence to payment of *Zakat* Tax and the strict maintenance of *Baitul Mal* during the time of the Holy Prophet of Islam and his four companions led to the prosperity and the raising of the standard of living in Muslim countries. Thus the saying of the Prophet of Islam came to be true, "Give *Sadaqat* freely, as a time is to come when people will offer *Sadaqat* and there would be none (needy person) to receive them" (*Mishkat*). In the short period of 30 years, the Arab economy was established on a sound footing. But during the Omayyad regime, the *Baitul Mal* was misused and instead of utilizing this fund for purely charitable and public purposes, the

Caliphs hence-forward used it for furthering their personal interests. Since that time the *Baitul Mal*, ceased to possess any importance and degenerated into an ordinary Imperial Treasury. Undoubtedly there were a few exceptions and Muslim rulers like Hazrat Omar Bin Abdul Aziz, Sultan Nasiruddin of Delhi and Aurangzeb Alamgir refrained from spending money out of the public treasury. The *Waqf* (Endowment) has been instrumental in financing and thus ensuring the smooth running of a large number of public and charitable institutions all over the Muslim world. Such institutions include mosques, *madrassas* (educational institutions) orphanages and hospitals. Large endowments are attached to some of the big public institutions in Muslim countries.

Socialist Principles

The Islamic economy, is to a great extent based on socialist principles which aim at maintaining the equality of man and eliminating too much disparity, between the rich and the poor. Its ideal economic principles have raised the general standard of living and have prevented the exploitation of the poor at the hands of the rich. Islam has struck at the root of the principle of making the rich richer and the poor poorer, which has been followed in the capitalist and imperialist states of the world since time immemorial. The early Caliphate proved the words of the Holy Prophet of Islam that if Muslims faithfully pay their *Zakat*, a time would come when there would be no needy person to receive the same. The unequal distribution of wealth is the basis of all human conflicts both indi-

vidual and social. Islam has evolved its economic principles on such lines as to minimise these disparities and eliminate distinctions in the distribution of human fortunes. The wealthy people are heavily taxed in order to help the poor and this taxation forms one of the cardinal principles of Islam which no true Muslim can violate.

Islam has steered midway between Capitalism and Communism—a mean between two extremes. Capitalism thrives at the cost of society and aims at building up private property. Communism has no place for private enterprise and economy. Islam while recognising one's right to build up private fortunes enjoins upon its followers to voluntarily part with $2\frac{1}{2}\%$ of their wealth every year for the benefit of the poor. This has greatly contributed to the removal of social inequality among Muslims in the past. It has, thus eliminated the defects of both Capitalism and Communism while retaining most of their virtues. Ensuring equitable and fair distribution of wealth, the Islamic economical system discourages the hoarding of wealth as idle wealth is also taxed $2\frac{1}{2}\%$ a year. It thus provides an incentive to the investment of capital in commerce and industry which means wider circulation of money, more employment and greater prosperity. Islam thus lays certain obligations (both moral and legal) upon its rich members which reduces the possibility of accumulating fabulous fortunes on their part. The Holy Book condemns hoarders in the strongest language. It says, "To those who hoard up gold and silver and spend them not in the way of Allah, tell them the tidings of a grievious

chastisement on the day when it (wealth) will be heated in the fire of Hell, and their fore-heads, their sides and their backs shall be branded with them. Moreover it will be said to them: 'This is what you did hoard (in the world) for yourselves; taste, therefore the fruits of what you hoarded there."[1]

Contrary to this, the persons who spend in the ways of God and keep the money in circulation are entitled to Divine blessings. The investment of wealth in useful pursuits and healthy trades does not only bring greater prosperity to oneself but also contributes to the well-being of others. So says the Holy Quran, "The likeness of those who spend their wealth in the ways of Allah is similar to a grain which groweth seven ears and in each ear are a hundred grains. And Allah giveth manifold increase to those. He willeth, for Allah is all encompassing and all knowing. Those who spend their wealth in the cause of Allah, and afterwards make not reproach, their reward is with their Lord and they should not be afraid or aggrieved" (II—261, 262).

The individual and the community are dependent upon one another. The prosperity of one means the prosperity of the other. Instead of ranging the interests of the individual and community against one another as is found in the economic systems of Communist and Capitalist states, Islam has recognised the interests of both. It has evolved such a healthy economic system that it has to a great extent mini-

[1]Holy Quran—(IX—34, 36).

mised the conflict between the interests of the indivi-dual and that of the community.

The laws of inheritance evolved by Islam further eliminate the possibility of the accumulation of wealth and property in the hands of a few individuals. Contrary to the Hindu laws of inheritance in which the female members of the family have been denied property rights, Islam ordains the distribution of property among the members of the family both male and female. Apart from ensuring a fair distribution of property among the family members, the Islamic laws of inheritance build a social harmony and maintain an uniformity in the standard of living. It breaks up property into family shares and thus prevents property from becoming the monopoly of a few. Instead of accumulating fortunes, the Islamic laws of inheritance lead to dispersal and distribution.

Islam recognises one's right of private ownership of wealth, but at the same time enjoins upon the faithful to earn wealth through unquestionable means. The Holy Quran states: "Allah permitted trading and forbideth Usury" (II : 275). It further states, "Give full measure and be not of those who give and weigh less. Do not deceive the people in matter of their goods" (XXVI—181—83).

Islamic economic principles control both the production and consumption of wealth. Recognising one's right of building private fortunes, it stresses that wealth in reality belongs to Allah which has been put in the custody of the individual, hence it should be spent in the ways of Allah which means in healthy pur-

suits. The Holy Quran states, "The wealth is of Allah which He hath bestowed upon you". (XXIV—33).

In an Islamic Economic system, ample subsistence to the individual is assured and it is for the Creator to provide livelihood to His every creature. The Holy Book states, "Slay not your children, fearing a fall to poverty. We shall provide for them and for you" (XVII—31). Again, "We have given you power in earth and appointed therein a livelihood. Little give ye thanks". Thus in an Islamic State, the State is to fulfil this guarantee of the Creator by providing subsistence to the poor out of the *Zakat* Tax.

Interest

Islam forbids both the taking and giving of interest. Modern economists, too, have slowly begun to realise the futility of interest. Keynes suggested the possibility of a zero rate of interest in stationary States, while Harrod advocated its total abolition. A number of modern economists have evolved the maintenance of a banking system without interest. A large number of failures in industrial and commercial enterprises in modern times is due to the high rate of interest charged on the money invested in them. A time comes when the borrower crumbling under heavy interest cannot borrow more money which results in the failure of his enterprise. Hence this institution is responsible for fluctuations in a number of ways. The well-known economist Marshall in his principles of Economics (Book IV, Chapter XIX) states, "the danger of not being able to renew his borrowings just at the time when he wants them more, puts him

(the borrower) at a disadvantage relatively to those who use their own capital much greater than is represented by the mere interest on his borrowing. And the failure of this renewal may cause him to succumb to what would have been a passing misfortune if he had been using no capital, but his own".[1] The depression and crisis in trade mostly results from the payment of high rate of interest. The socialists have wrongly attributed such crises to capitalism. In fact interest is the greatest evil of capitalism and it is rather the worst form of capitalism. The Islamic economy which accepts a form of capitalism without interest has almost eliminated its harmful aspects. The Holy Prophet of Islam has advised Muslims to avoid seven harmful things and the third among these is interest. He stated, 'Although interest brings increase, yet its end tends to scarcity'. The Holy Quran says, "That which ye give in interest in order that it may increase other peoples' wealth hath no increase with God; but that which ye give in growth tax, seeking God's countenance hath increases manifold" (XXX—39).

Even such well-known Economists as Piogu and Fisher have acknowledged the harmful effects of interest in causing commercial fluctuations and industrial crises. Islam favours the formation of joint stock companies and the Arabs were the first to start such companies. Trade partnership was very popular even in the days of the prophet of Islam. He himself had been the business partner of Hazrat Khadija,

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[1]Principles of Economics—Marshall (Book IV, Chapter XIX)

who later became his wife. Business shares could also be purchased.

Thus the Islamic economic principles if strictly followed would eliminate the possibility of accumulation of wealth in the hands of a few and would ensure the greater circulation of money as well as a wider distribution of wealth. Broadly speaking these principles are (1) *Zakat* or compulsory alms giving (2) The Islamic law of inheritance which splits the property of an individual into a number of shares given to his relations (3) The forbiddance of interest which checks accumulation of wealth and this strikes at the root of capitalism.

The sound economic system evolved by Islam if given a fair trial would solve the basic economic problems which have been troubling the modern world.

MUSLIM PHILOSOPHY

Philosophy as defined by ancient thinkers is the Science of wisdom. It embraces all branches of knowledge, hence a philosopher in the time of the Greeks was recognised as a truly wise man.

Greek philosophy had becom dead in Europe and its teaching was banned by the Church as its knowledge made people inactive and irreligious. The Arabs revived Greek philosophy and it was through Kindi, Farabi, Avicenna and Averroes that the West learnt about Aristotle, Plato and Socrates. Arabian philosophy began with the warm reception of Greek philosophy in Arabia, when it had "vanished from its original soil, and whilst western Europe was still too crude and ignorant to be its home. Arabian philosophy at the outset of its career in the 9th A.D. century was able without difficulty to take possession of these resources for speculative thought which Latins had barely achieved at the close of the 12th century by the slow process of rediscovering the Aristotelian Logic from the commentaries and verses of Boethius".[1]

The Abbasid Caliphate which was influenced by Persian culture provided the most congenial atmosphere for the development of learning especially philosophy. Secular philosophy found its first entrance into the Muslim world through the Persian

[1]Encyclopaedia Britannica, Vol. II 'Muhammaden Philosophy'.

administrators of the early Abbasid Caliphate. The Abbasid Caliph Harun-ar-Rashid had some of the works of Aristotle translated into Arabic for the first time. His successor Mamun-ar-Rashid founded the well-known *Darul Hukama* (House of Wisdom) where the translation of books from foreign languages into Arabic was made by eminent translators who were employed on handsome salaries by the talented Caliph. His great patronage of learning attracted men of letters from all parts of the world who were engaged in translation and research work. The translation of the works of A ristotle and Plato paved the way for the growth of Islamic philosophy. The harmonisation of Greek philosophy with Islam was started by Al-Kindi, continued by Farabi and was completed by Ibn Sina and Ibn Rushd. Of the great Muslim philosophers Al-Kindi belonged to Basrah, Farabi, Ghazali and Ibn Sina hailed from Turkistan and Persia, while Ibn Rushd, Ibn Bajja and Ibn Tufail who rivalled their Eastern counterparts were natives of Muslim Spain.

Al-Kindi (d!873 A.D.), who is the greatest philosopher of the Arab race is known as the " Philosopher of the Arabs". He translated and wrote commentaries on a number of works by Aristotle. Being a natural philosopher he elaborately discussed the doctrine of soul and intelligence. The divine intelligence is the cause of the existence of the world. According to him, the world as a whole is the work of an extremely active cause, the divine intelligence, whose activity is transmitted in many ways from above to the world. Be-

tween God and the world of bodies is the world of soul, which created the world of Heavenly spheres. In so far as the human soul is combined with the body, it is dependent on the influence of heavenly bodies, but in its spiritual origin and being it is free. Both immortality and freedom could be attained in the world of intelligence. It was in *De Intellectu*, the Latin translation of Al-Kindi's philosophical work, that the West discovered for the first time the doctrine of intelligence.

Towards the close of the 10th century A. D. there flourished in Basrah a Philosophical Society known as *Ikhwan-al-Safa* (Brethren of Purity). They tried unsuccessfully to reconcile religion with science. Their encyclopaedic work consisting of 51 treatises contain the idea of goodness and moral perfection. They had a leaning towards Pythagorean speculations. Abu Nasr Farabi (d/950 A. D.) whose philosophical system according to George Sarton, "is a syncretism of Platonism, Aristotelianism and *Sufism*, was the founder of the Turkish School of Philosophy. He was an exponent of Neo-Platonic Philosophy, a system which was originated by Al-Kindi and was developed by Ibn Sina. There is a marked difference between the philosophical approach of Farabi, which is deductive, rational and abstract and that of Zakariya Razi which is inductive, experimental and concrete. The two systems in fact present two sides of the same picture. Razi being a naturalist emphasised the experimental side while Farabi having been inclined

towards mysticism looked to the speculative and abstract side. In Ibn Sina these two systems are reunited though Ibn Sina is more methodical in his approach. The difference between Farabi and Ibn Sina is more pronounced on the question of the immortality of the soul which is accepted by the former and rejected by the latter. Like Plato, Farabi is a mystical thinker, whose reasoning finally leads him to mysticism and metaphysics. He was a *Savant* in the true sense of the word, and led a life of minimum wants. With him like all other mystics contemplation dominated action. He has tried to give philosophical and rational explanations of such intricate religious problems as prophecy, inspiration, heavens, destiny and Celestial Throne. Prophecy according to him is a form of moral perfection rather than an innate gift. In this way he is recognised as the founder of philosophical theology, which later on found its great exponent in Fakhruddin Razi. He was also the first to preach practical morality by recognising that the faculty of discerning good from evil is possessed by oneself.

Zakariya Al-Razi (865—925 A. D.) the eminent physician and scientist of Islam composed a number of metaphysical, philosophical and ethical works which have perished and only a few pieces are still available. Al-Razi professes the existence of five eternal principles in metaphysics—namely the Creator, the soul, matter, time and space. In spite of his pessimistic outlook in metaphysics he is opposed to asceticism and believes in working for the welfare of

the people. Like Aristotle he does not blame human passion but only its excessive indulgence. He believed in the evolution of scientific and philosophical knowledge and in this respect he is much ahead of his predecessors.

Ibn Sina (980—1037 A. D.) the most illustrious name amongst the oriental Muslims, whose rational philosophy tried to explain religious dogmas in the light of reason and thus invited severe criticism from Imam Ghazali. Like his predecessors he tried to harmonise abstract philosophy with religion. His main philosophical works are *Kitab-as-Shifa*, (The Book of Recovery), *Al-Najat* (The Salvation) and *The Isharat* (Instructions). His *Kitab-as-Shifa*, dealing with metaphysics, physics and logic had deeply influenced Western as well as Eastern philosophy. His philosophical works reflected a conflict between materialism and idealism. He expounded the philosophical doctrines of Farabi and followed him in logic and epistemology. He has more clearly brought out the dualism of mind and matter, God and the world. The doctrine of the immortality of the soul is more definitely laid down by him. His philosophy brings out his scientific and progressive outlook. His compromise with Muslim theology did not find favour in orthodox circles and his philosophical works were burned in Baghdad. He explained the moving, changing and developing state of nature. His philosophy is the necessary link between the philosophy of Farabi and Ghazali on one hand and that of Ibn Rushd (Averroes) on the other.

Abu Hamid Al-Ghazali (1058—1111 A. D.) the great Muslim theologian and philosopher realised that the study of secular philosophy had resulted in an indifference towards religion. He renounced the life of pleasure and wandered in the Islamic world in search of mental peace. The conflict which had started in him gave him no rest and was fully brought out in his monumental work *Ihyaal Ulum*, which ranks amongst the greatest ethical works of Islam. He attacked the rationalistic and materialistic views of his predecessors including that of Ibn Sina and utimately found solace in mysticism. His severe criticism of materialistic philosophy was afterwards answered by Ibn Rushd (Averroes). In Islam the theological system entrenched itself towards the end of the 12th century A. D. in the narrow orthodoxy of the *Isharites*. The entire ethical philosophy of Al-Ghazali rests on the foundation of mysticism. He had himself gone through the different phases of worldly life—namely scholastic discussions, the pride of high office, popularity among the people and the pomp and wealth. He had personally experienced the effects of such contacts on one's character. He has described these experiences in his immortal *Ihyaal Ulum*. His writings started a school of religious philosophy and influenced such outstanding thinkers as Maulana Rum, Shaikhul Ashraq, Ibn Rushd and Shah Waliullah. Al-Ghazali was mainly responsible for infusing mysticism into Persia and directing it into the right channels. He tried to reconcile the tenets of Islam with the teaching of the prevailing philosophy and science but

not in a purely rational way as done by Farabi and Ibn Sina. His *Ihyaal Ulum* was widely read by Jews, Christians and Muslims alike and influenced Thomas Aquinas and even Blaise Pascal.

Ibn Rushd (1126—1198 A. D.) better known as Averroes in the West is undoubtedly the greatest philosopher of Islam. Together with Ibn Masarra and Ibnul Arabi, he forms the trio of the great philosophers of Muslim Spain. The first two were essentially mystics while the third (Averroes) was a rationalist. He rose to be the greatest commentator of and exponent of Aristotelian philosophy. It was through his commentaries that the West learnt about Aristotle.

His Chief philosophical work is *Tahafut-al-Tahafut* (The incoherence of the incoherence) which was written in refutation of Al-Ghazali's work, *Tahafut-al-Falasifa* (The destruction of philosophy). The philosophical writings of Averroes invited severe criticism and stirred up critical reactions throughout the Islamic world. A strong refutation of Ibn Rushd's arguments in *Tahafut-al-Tahafut* was made by a Turk, Mustafa Ibn Yusuf al-Bursavi, commonly known as Khwaja Zada (d/1487-88 A.D). This once more established the strength of faith and the weakness of human understanding. But contrary to Muslim reactions, Averroes philosophical writings had a deep influence on Christian Europe. Alfred Gillaume in his article on philosophy and theology in the *Legacy of Islam.* writes that' "He (Averroes) belongs to Europe and European thought rather than to the East....Aver-

roism continued to be a living factor in European thought until the birth of modern experimental science. Latin is said to have preserved more than one of Ibn Rushd's works which Arabic has lost".[1]

Regarding predestination, Ibn Rushd maintained that man was neither the absolute master of his destiny nor bound by fixed, immutable decrees. According to him the truth lies in the middle, i.e. *Al-Amr Bain Al-Amrain.* Human actions depend partly on free will and partly on outside causes. These causes spring from the general laws of nature—God alone knows their sequence. According to him man should make the utmost effort to attain perfection by which he means, complete identification with the alive intellect. This human perfection can be attained through study, speculation and negation of desires—specially those relating to senses.

This philosophy was considered to be irreligious in Muslim Spain where the society was formulated on true Arabic lines. Being a rational philosopher, his ideas were incompatible with the religious sentiments of orthodox Muslims and he was accused of being an atheist. But according to Philip K. Hitti, 'He was a rationalist and claimed the right to submit everything save the revealed dogmas of faith to the judgment of reason, but he was not a free-thinker or unbeliever. His view of creation by God was evolutionary: not a matter of days but of eternity".[2]

[1]Legacy of Islam, page 275.

[2]History of the Arabs, Edition V, page 584.

Averroism had a great influence on Europe. Jews became the greatest exponents of Averroism in the West. In Southern France, the philosophical thought was influenced by Averroists. At Oxford Averroes was known as the great commentator and Bacon ranked him alongside Aristotle and Ibn Sina (Avicenna). Averroism continued to be taught in the universities of Northern Italy including Padua which was its great centre. Other well-known philosophers of Muslim Spain were Ibn Bajja, Ibn Tufail and Ibnul Arabi. Ibn Bajja (d/1138 A.D.) known as Avempace in the West has explained in his treatise *Tadbir al-Mutawahhid* (The Regime of Solitary), how man unaided can attain union with the active intellect. He considered that gradual perfection of the human spirit through union with the Divine is the object of philosophy. The *Philosophus Antodiductus* of Ibn Tufail (d/1185 A.D.) became a world classic.

Ibnul Arabi (1165—1240 A. D.) the greatest speculative genius of Islamic *Sufism* was born in Murcia (Spain). According to Ibnul Arabi the divine power manifests itself in the form of a perfect man which is of course, Muhammad (Peace be on him). His writings on mysticism influenced not 'only Persian and Turkish *Sufi* circles but also Duns Scots, Roger Bacon and Raymond Lull. The greatest exponent of mysticism in the East was Al-Suhrawardi (1191 A. D.).

Nasiruddin Toosi (1201—74 A.D.) wrote a large number of philosophical, metaphysical and theological treatises. In orthodox circles his fame chiefly rests

on these treatises. His *Kitab al-Fasul* dealing with metaphysics was written in Persian, which was translated into Arabic by al-Jurjani. His great philosophical work *Tajrid al-Aqaid* (*Al-Kalam*) is his most popular work on which a large number of commentaries have been written in Arabic, Persian and Turkish. His outstanding work on ethics entitled, *Ikhlaq-i-Naasiri* (Nasirian Ethics) is one of the best books on the subject and is still taught in Arab schools.

Islam had developed a Religious Philosophy of its own which is called *Ilm-ul-Kalaam* or Science of the word. The secular and scholastic philosophy receded into the background in the East after the vehement criticism of such philosophy by Imam Ghazali. But the philosophical and religious writings of Ghazali gave a fillip to religious philosophy and especially to mysticism and produced such outstanding religious philosophers as well as mystics as Fakhruddin Razi, Nasiruddin Toosi, Fariduddin Attar, Maulana Jalaluddin Rumi, Ameer Khusro and Dr. Iqbal. The development of Islamic philosophy, thus took a new turn in which the later philosophers have made outstanding contributions—both through Prose and Poetry.

ISLAMIC BACKGROUND OF WESTERN RENAISSANCE

The nomadic Arabs, who rose from their desert tents, founded in remarkably short space of time, the mightiest empire of the Mediaeval era, which stretched from the shores of the Atlantic in the West to the Great Wall of China in the East. Their success in the field of territorial conquests was no more spectacular than their achievements in the realm of knowledge. In fact they brought about the greatest revolution in the history of mankind—a revolution which embraced all aspects of human activity. The memorable words of the Holy Prophet of Islam, "Go in quest of knowledge even unto the distant China", awakened a spirit of enquiry among the Arabs which, hitherto lay dormant in them. The Muslims, who were the pioneers in all branches of knowledge during the Mediaeval times provided the necessary link between the ancient and modern civilizations. The light of knowledge which illuminated the lands of 'Moors' in Spain and Sicily, was greatly instrumental in dispelling the gloom of ignorance that had enveloped the Mediaeval Europe. "It was under the influence of Arabian and Moorish revival of culture", writes Robert Briffault in his well-known work *The Making of Humanity*, "and not in the 15th century, that the real renaissance took place. Spain and not Italy, was the cradle of the

rebirth of Europe. After sinking lower and lower in barbarism, it had reached the darkest depths of ignorance and degradation when the cities of the Saracenic world Baghdad, Cairo, Cordova, Toledo, were growing centres of civilization and intellectual activity. It was there that the new life arose which was to grow into a new phase of human evolution. From the time when the influence of their culture made itself felt, began the stirring of a new life".[1] Another great orientalist Philip K. Hitti, acknowledges the greatness of Arab culture when he writes in his *History of the Arabs*: "Moslem Spain wrote one of the brightest Chapters in the intellectual history of mediaeval Europe. Between the middle of the 8th and the beginning of the 13th centuries, as we have noted before, the Arab speaking peoples were the main bearers of the torch of culture and civilization throughout the world. Moreover they were the medium through which ancient science and philosophy were recovered, supplemented and transmitted in such a way as to make possible the renaissance of western Europe. In all this Arabic Spain had a large share".[2]

The quest of knowledge was not confined to intellectuals only. Even the great Caliphs and their courtiers vied with each other in the patronage and pursuit of knowledge. "In the midst of all this luxury", writes John William Draper, in his *The Intellectual Development of Europe*, which cannot be regarded by the historian with disdain, since in the end it pro-

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[1]Making of Humanity, pages 188-89.
[2]History of the Arabs, page 557.

duced a most important result in the South of France, the Spanish Caliphs emulating the example of their Asiatic compeers, and in this strongly contrasting with the Popes of Rome, were not only the patrons, but the personal cultivators of all the branches of human learning. One of them was himself the author of a work on polite literature in not less than fifty volumes, another wrote a treatise on algebra. When Ziryab the musician came from the East to Spain, the Caliph Abdur Rahman rode forth to meet him in honour".[1] Another reputed Western historian says, "The incorruptible treasures and delights of intellectual culture were accounted by the princes of Baghdad, Shiraz and Cordova, the truest and proudest pomps of their courts. But it was not a more appanage of princely vanity that the wonderful growth of Islamic Science and learning was fostered by their patronage. They pursued culture with the personal ardour of an overmastering craving. Never before and never since, on such a scale, has the spectacle been witnessed of the ruling classes throughout the length and breadth of a vast empire given over entirely to a frenzied passion for the acquirement of knowledge. Learning seemed to have become with them the chief business of life. Caliphs and Amirs hurried from their *Diwans* to closet themselves in their libraries and observatories. They neglected their affairs of State to attend lectures and converse on mathematical problems with men of science".[2]

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[1] Intellectual Development of Europe, Vol. II, page 34.
[2] Making of Humanity, page 188.

Western historians have purposely avoided acknowledging the debt which their modern civilization owed to the Muslims and till the beginning of the 18th century A.D., the factors which brought about the renaissance in Europe were shrouded in mystery. The greatness of Muslim achievements in diverse branches of learning was hidden behind the thick cover of Western partisanship. Writing in his celebrated work, *The Intellectual Development of Europe*, John William Draper says, "I have to deplore the systematic manner in which the literature of Europe has contrived to put out of sight our scientific obligation to the Muhammadans. Surely they cannot be much longer hidden. Injustice founded on religious rancour and national conceit cannot be perpetuated for ever..... The Arab has left his intellectual impress on Europe, as, before long, Christendom will have to confess; he has indelibly written it on the heavens, as anyone may see who reads the names of the stars on a common celestial globe".[1] The fair minded Robert Briffault has more convincingly exposed the game of early Christian historians who totally ignored the influence of Muslim culture on the revival of the West. He says, "The debt of Europe to the 'Heathen Dog', could, of course, find no place in the scheme of the Christian history, and the garbled falsification has imposed itself on all subsequent conceptions". Even Gibbon treated Islam depreciatingly, an instance of the power of conventional tradition upon its keenest opponents. Until the last century there did not even exist anything approaching accurate knowledge of Saracenic history

[1]Intellectual Development of Europe, Vol. II, page 42.

and culture. 'These accounts of Muhammad and Islam which were published in Europe before the beginning of the 19th century are now to be regarded simply as library curiosities'. (Prof. Bevan—*Cambridge Mediaeval History*). The history of the rebirth of Europe from barbarism is constantly being written without any reference, whatsoever, except to mention, the 'triumphs of the Cross over the Crescent', and 'the reclamation of Spain from the 'Moorish Yoke', to the influence of Arab Civilization—*the History of the Prince of Denmark without Hamlet.* Dr. Osborn Taylor has even achieved the feat of writing two large volumes on *The Development of the Mediaeval Mind* without betraying by a hint the existence of Muhammadan culture. That a brilliant and energetic civilization (of the Muslims) full of creative energy should have existed side by side and in constant relation with populations sunk in barbarism (the Christian West), without exercising a profound and vital influence upon their development, would be a manifest anomaly...... "It is highly probable that but for the Arabs modern European civilization would never have arisen at all; it is absolutely certain that but for them, it would have not assumed that character which has enabled it to trascend all previous phases of evolution. For although there is not a single aspect of European growth in which the decisive influence of Islamic culture is not traceable, nowhere is it so clear and momentous as in the genesis of that power which constitutes the permanent distinctive force of the modern world and supreme source of its victory—natural science and the scientific spirit".[1]

[1]Making of Humanity, pages 189 and 190.

Thus Christian Europe was rather slow to recognize the greatness of Islamic learning and its influence on the Revival of the West. Westerners like John Davenport, Stanley Lane Poole, M.P.E. Berthelot and more recently Holmyard, Max Meyerhof, George Sarton, Philip K. Hitti, Robert Briffault and John William Draper have gratefully acknowledged the part played by Muslims in the advancement of learning and the awakening of Europe. "Down to the 15th century", writes a western historian, "Whatever scientific activity existed in Europe was engaged in assimilating Arab learning without greatly adding to it."

Islamic Institutions

The Muslim State of Spain had cultivated a great civilization and a high degree of culture. Its well planned cities and well organised public works including the well laid out streets, parks, schools, colleges and hospitals made it a model State in the West whose phenominal cultural, industrial and social progress was viewed with wonder by the Christian visitor. The Moors had introduced beneficial irrigation systems and new crops in Spain. The high class fabrics manufactured in their textile factories were used in the Royal Houses of Europe. Cordova, the Capital of Moorish Spain was the most cultured city of Europe. With its 113,000 houses, 21 suburbs, seventy big libraries and numerous colleges, mosques, palaces, parks and gardens it had acquired international reputation. With its well-illuminated streets, Cordova provided a striking contrast to the European cities and according to John William Draper, "Seven hundred

years after this time there was not so much as one public lamp in London....... In Paris, centuries subsequently, whoever stepped over his threshold on a rainy day stepped up to his ankles in mud".[1] When the student of the University of Oxford abhorred baths as heathen custom the Moors enjoyed baths in luxurious establishments. Whenever the Christian rulers of European States needed an artist, physician or technical hand, they applied to the Cordova Government. "The fame of the Muslim Capital penetrated as far as the distant Germany where a Saxon nun (Hrosvitha) styled it as 'The Jewel of the World'. The great social and cultural progress of Cordova inspired awe and admiration in the hearts of European travellers".

The Muslims of Spain had taken long strides in almost all branches of knowledge and had evolved an educational system which embraced all sciences and arts. A large number of educational institutions had sprung up in the four corners of the State including in Cordova, Granada, Toledo and Seville, where learned teachers imparted lessons in the sciences and arts. These Islamic institutions of Muslim Spain and Sicily were the cradle of modern European civilization and the training ground of persons like Roger Bacon and Gerbert Aurillec who ultimately paved the way for the renaissance of Mediaeval Europe. The Christian students enjoyed absolute religious tolerance and complete social freedom in Muslim Spain, which attracted large number of Christian students from all parts of Europe, who after completing their studies

[1] Intellectual Development of Europe, Vol. II, page 31.

in Moorish Schools went back to their native places and taught new theories to astonished people. "From all parts of Europe", says Robert Briffault, "numerous students betook themselves to the great Arab seats of learning in the search of light which only there was to be found. Alvaro, a Cordovan Bishop, writes in the 9th century A.D. 'All the young Christians who distinguished themselves by their talent, know the language and literature of the Arabs, read and study passionately the Arab books, gather at great expense great libraries of these, and everywhere proclaim with loud voice how admirable is that literature'."[1] The celebrated Gerbert of Aurillec who studied in Moorish school, brought from Spain some rudiments of astronomy and mathematics, and taught his astonished peoples from terrestrial and celestial globes. His great knowledge which in the word of William of Malmesbury was 'Stolen from the Saracen', had made him as Pope Sylvester II.

The Jews, who soon mastered the Saracenic sciences and arts carried the Muslim theology and philosophy to the distant Benedictine monasteries and the metropolitan house of Monte Cassino. According to Alvaro, the Bishop of Cordova in the 9th century A. D., a large number of Christians studied Muslim Theology and philosophy. Peter the Hermit, the Abott of Cluny,' lamented that, during his stay in Spain he had seen troops of students from Germany, France, England, flocking to the Moorish seats of learning'. In spite of the strict restrictions imposed by the orthodox Christian mis-

[1]Making of Humanity, page 198.

sionaries on the diffusion of Islamic learning in Europe it penetrated as far as distant Germany and far off England. Frederik II, the Emperor of Italy and Sicily was accused of being a Muslim due to his patronage and love of Islamic learnings. Muslim Sicily did not lag behind in the cultivation of a high standard of civilization including the founding of big institutions for teaching sciences and arts. Even after the fall of the Muslim State, the Norman kings of Sicily continued to patronise Muslim learnings, for which they were condemned by the Pope.

Gradually the Arabic sciences and arts made their way into Europe, which led to the opening of a number of institutions in France, Germany and even in England where Arabian sciences were taught by teachers who had learnt them in Muslim Spain and Sicily. Montpellier in the 14th century A.D., was the principal centre for the teaching of Arabian medicine and astronomy in France. "By the close of the 13th century", writes Philip K. Hitti, "Arabic science and philosophy had been transmitted to Europe, and Spain's work as an intermediary was done. The intellectual avenue leading from the portals of Toledo through the Pyrenees wound its way through Provence and the Alpine passes into Lorraine, Germany, and Central Europe as well as across the Channel into England".[1] It was in Marseilles, a French port on the Mediterranean that in 1140 A.D. Raymond prepared planetary tables based on those of Toledo. The famous Abbey of Cluny in southern France which housed a number

[1]History of the Arabs, page 589.

of Spanish monks in the 12th century A.D. became an important centre for the diffusion of Arabian knowledge. As early as the 10th century A.D. Arabian sciences were introduced in Lorraine, which after two centuries grew into an important region for scientific study. Cities like Liege, Cologne, and Gorze provided the most congenial atmosphere for the growth of Arabian knowledge. "From Lorraine it radiated into other parts of Germany and was transported into Norman England by men born or educated in Lorraine. Embassies between German kings in the North and Muslim rulers in Spain were frequent and intellectually fruitful. As early as 953 A.D., Otto the Great, King of the Germans, sent as an envoy a Lotharingian monk, John by name, who resided in Cordova for nearly 3 years, probably learned Arabic and brought back with him scientific manuscripts. Thus did Spanish Arabic learning premeate all Western Europe".[1]

The translated works of Arab scientists in botany, zoology, physics and alchemy were taught in European universities specially those of Northern Italy and France. Jews, after Muslims, were the great exponents of Arab learning and founded schools along Spanish lines at Bari, Salerno, Tarentum and other places. Bartholo Ceuse had named 4,000 Jewish scholars scattered all over southern and western Europe who had imbibed Arab civilization and culture and were well versed in Arabian learning. According to the Right Honourable Lecky, the author of *Rationalism in Europe*, "Jewish learning and Jewish genius

[1]History of the Arabs, page 590.

contributed very largely to that bright, but transient civilization which radiated from Toledo and Cordova and exercised so salutary an influence upon the belief of Europe". The educated Jews, whose medium of education in Spain was Arabic, took a leading part in the translation of Arabic works into Hebrew and other European languages. The Jewish teachers disseminated Arabian medicine and other sciences in the medical schools of Salerno and other European countries.

The Jews who enjoyed complete tolerance in Muslim Spain took a lively interest in the development and popularisation of Arabian learning both during and after the Moorish regime. They were scattered all over Europe after the Almohadeen conquest and became the ambassadors of Arabian culture wherever they went. French and German monks including Hildegard and Hrosvitha, the literary nuns of the Thuringian convent, learnt Arabian sciences from them. The wandering Jews founded numerous schools such as those of Kimhic and Ben Esra of Norbonne, where the diffusion of Arabian learning was carried on through translation and teaching. A large number of these Jews accompanied William of Normandy to England where they established the first English school of science at Oxford, in which Arabian sciences were freely taught. It was in this school that Roger Bacon learnt Arabic sciences from Jewish teachers.

Translations

The Christian Scholars who had studied in the institutions of Muslim Spain translated several im-

portant works of Arab writers into European languages which provided the firm ground on which the stately edifice of Western learning was raised. During the 12th and 13th centuries A.D. the process of the diffusion of Arab sciences assumed massive scale and there were several centres in southern France for the dissemination of Arabian Culture. Constantine, an African monk (1087 A.D.), who had acted as secretary to Robert Guiscard, translated several Arabic works including the theoretical part of Ali Ibn Abbas, *al-Kitab al-Maliki*. The surgical part of the book was translated into Latin by John, a disciple of Constantine. Gerard of Cremona was one of the greatest exponents of Arabian learning. He spent more than 50 years in Muslim Spain devoting himself to the pursuit of Arabic learning and translated more than ninety Arabic works including *Al-Qanun*, the monumental medical works of Ibn Sina, *Almagest* of Ptolemy, *Tasrif* of Al-Zahrawi, *Al-Mansuri* of Al-Razi and the astronomy of Al-Haitham. Faraj ben Salim, the Sicilian Jew, translated in 1279, *Al-Hawi*, the well-known medical work of Al-Razi as well as *Taqwim al-Abdan*, written by Ibn Jazlah. Europe is chiefly indebted for its knowledge of Arabic medicine to Constantine, Gerard of Cremona and Faraj ben Salim whose translations paved the way for the growth of medical science in the West. Adelard of Bath, attached for a considerable time to the house of Benedictine was the greatest Arabist of England who popularised Arab learning in France and England. He brought a large number of books from Cordova, which he translated and popularised in England. Of his many translated works, the outstanding are

the *Elements of Euclid*, the *astronomical tables* of Majriti (1126 A.D.), the *astronomical tables* of Al-Khwarizmi, the *astronomical tables* of Abu Ma'sher Jafar and many other astronomical and mathematical treatises. Toledo, after its fall into Christian hands in 1085 A.D. became an important centre for the transmission of Arabic literary treasures to the West. Under the guidance of Archbishop Raymond I (1126—51 A.D.) there arose a regular translation deparment in which Michael Scot, Robert Chester and Gerard of Cremona made valuable translations of important Arabic works. Michael Scot (1236) who is considered as one of the founders of Latin Averroism later became the court astrologer of Frederick II of Sicily. He translated among other works *Al-Hai'a* (Bitruji's astronomy), Aristotle's *De Coelo et-Mundo*, with Ibn Rushd's commentary, and many Arabic works on zoology. His translations of Ibn Rushd's works greatly influenced the later European philosophers. Robert Chester made the first translation of Al-Khwarizmi's algebra in 1145 A.D. In 1143 he along with Hermann, the Dalmatian, completed the first translation of the Holy Quran. Gerard of Cremona was the most prolific of Toledo translators. Leorardo Fibonacci, who travelled extensively in Spain and Algeria learnt Arabic mathematical science and translated the great work of Al-Khwarizmi on algebra. His translated works greatly influenced later writers, hence he is considered the founder of modern mathematics in Europe. He greatly popularised the perfected decimal notation in Europe. Daniel de Morley who studied astronomy and mathematics in Cordova, published a number of

works and lectured at the Oxford School. Theodore of Antioch translated into Latin, an Arabic work dealing with hawking, which is considered as the first modern natural history. Abraham Ben Ezra (1167 A.D.) a Jew of Toledo translated al-Beruni's commentary on Khwarizmi's Tables. John of Seville translated among others the medical and philosophical works of al-Farghani, Abu Mahsar, Al-Kindi and Al-Ghazali. Plato and Tivoli translated the astronomy of Al-Battani as well as other mathematical works. Companus of Novara who had studied mathematics at Corodva taught the subject in Vienna. Alfonso, the sage had established schools at Toledo for the translation of Arabic works. Stephens of Egypt who received his education in Muslim Sicily translated the important medical work of al-Majusi in 1127 A.D.

Sicily stands next to Spain in the diffusion of Arab culture. Muslim learning was transmitted to Europe from Spain and Sicily. Even after the conquest of Sicily at the hands of the Normans in 1091 A.D. the Christian rulers exercised great tolerance towards Muslims and contrary to their counterparts in Spain patronised Muslim culture. The superior culture of the conquered race had won the hearts of the conquerors, so much so that Roger, the first King of Sicily and his successors were accused of being more Muslim than Christian. Sicily, which even in the Christian era continued to be a great centre of Muslim civilization, played a vital part in the awakening of Europe. The civil administration of Sicily served as a model for Europe. It was Thomas Burn, who introduced the

English fiscal system during the reign of Henry II, which he had learnt in Muslim Sicily. Sicily, with its central position served as an intermediary between the two cultures, Christian and Muslim. It provided an ideal centre for the dissemination of Arabic civilization. There was continuous intercourse between the two Norman States of England and Sicily which was instrumental in bringing many elements of Muslim culture to distant Britain. Emperor Frederick II, in spite of strong opposition from the orthodox quarters, continued to be the greatest patron of Muslim culture in Europe. "Its great far-reaching influence reached its height when the kingdom passed into the hands of the great Italian born Emperor Frederick II," writes Robert Briffault, "whose radiant figure filled the Middle Ages with wonder. If the name of any European sovereign deserves to be specially associated with the redemption of Christendom from barbarism and ignorance it was not that of Charlemagne, the travesty of whom in the character of a civilizer is a fulsome patriotic and ecclesiastical fiction, but that of the enlighted and enthusiatic ruler (Frederick II) who adopted Saracenic civilization and did more than any sovereign to stimulate its diffusion".[1] The Jews of Sicily played a vital role in the diffusion of Arabian learning in Europe. Of them Farragut of Sirgent, Mose of Palermo and Faraz Ben Salem are noteworthy. The first two translated the astronomical and medical works of Arabs into Latin. Southern Italy which was ruled by the Norman Kings of Sicily considerably assisted in diffusing Arab culture to nor-

[1]Making of Humanity, page 212.

thern Italy and even to central Europe. A number of translators worked in western Italy. Burgundio of Pisa (1130 A.D.) translated ten books of Galen; Bonacosa, a Jew translated the *colliget* of Ibn Rushd at Padua and Paravisius translated the *Taysir* of Ibn Johral at Venice. Due to a lack of appropriate words, Arabic technical words and scientific terms were adopted in Latin. Thus the Arabic words alchemy, alcohol, azure, cipher, elixir (al-Taksir) were introduced into the vocabulary of Europe and are still in use.

The work of translating Arabic works continued unabated till the middle of the 17th century A.D. Great attention was paid to the translation of Arabic chemical works. Andrea Alphago of Baluno of Italy (1520 A.D.) translated the biographical dictionary of Ibn Kifti as well as some of the important works of Galen, Ibn Sina and Ibn Rushd. A work of Abdur Rahman on music and the Pyramids was rendered into Latin by Piyare Vattier of Orleans in 1664 A.D.

The period of translation was followed by a period when Arabian knowledge was systematised, assimilated and the ground prepared for the creative works which brought about the renaissance in Europe. The systematisers arranged the vast material obtained through Arabian sources and paved the way for the intellectual growth of Europe. Among the foremost systematisers were Alexander of Halle (1245 A.D.), Robert Grosseteste (1255 A.D.), St. Thomas Acquinas (1225-75 A.D.) Albertus Magnus (1193-1290 A.D.)., Roger Bacon (1214-94 A.D.), Arnold of Villanova (1255-1320A.D.), and Peter of Abano (1250-1320 A.D.). "The impulse

of this intellectual activity", writes Campbell, "was derived in the main from the Arabian writers and Albertus Magnus and Roger Bacon were the eminent types of Arabo-Scholastics of the period who derived the basis of their learning from Arabian sources."

Roger Bacon (1214-94 A.D.) is considered the father of the European renaissance. He was educated by Jewish teachers in the Oxford School which was established, for the propagation of Muslim science by Jews who had been driven out of Spain by the Christians and had reached England along with William of Normandy. According to M. N. Roy, "Roger Bacon was a disciple of Arabs". Roger Bacon, who in the West is known as the originator of the experimental method in Europe had himself received his training from the pupils of Spanish Moors and had learnt everything from Muslim sources. The writer of the article "Roger Bacon" in the *Encyclopaedia Britannica* claims that 'it is beyond all doubt that Roger Bacon was profoundly versed in Arabian learning and derived from it many of the germs of his philosophy." The influence of Ibn Haitham (Alhazen) on Roger Bacon is clearly visible in his works. Europe was rather slow to recognise the Islamic origin of her much advertised scientific (experimental) method. Writing in the *Making of Humanity*, R. Briffault admits that "It was under their successors at the Oxford School that Roger Bacon learned Arabic and Arabic science. Neither Roger Bacon nor his later namesake has any title to be credited with having introduced the experimental method. Roger Bacon was no more

than one of the apostles of Muslim science and method to Christian Europe; and he never wearied of declaring that the knowledge of Arabic and Arabic science was for his contemporaries the only way to true knowledge".[1] As a reward for his love of Arabic science, Roger Bacon was thrown into prison as a 'sorcerer' and he died shortly after his release from 10 years' imprisonment.

The Crusades were partly responsible for popularising Muslim learning in Christian Europe. The direct contacts of the Christian west with Muslims in Palestine made the Christian scholars like Raymond Lull of Catalonia (1235—1315 A. D.), realise the futility of conquering Islam by brute force and attempt to win their hearts by peaceful means. This necessitated the learning of Arabian sciences and of training Christian missionaries in Arabic culture. Such a training centre was established in Toledo in 1250 A. D. Raymond the Martin, who was the principal scholar of this school, founded a monastic college at Miramar in 1276 A. D. Probably it was Martin who influenced the ecclesiastical council of Vienna in 1311 A.D. to adopt a Resolution to create the chair of Arabic language at the Universities of Paris, Louvain and Salamanca. According to Lec Clerc, "The contacts of the Arabs with southern Italy and the Crusades contributed to the spread of Arabian medicine and culture generally in the west of Europe". Campbell also testifies to the above view when he says, "the crusaders were undoubtedly influenced by the medical and philosophical

[1]Making of Humanity, pages 200 and 201.

doctrines of the Arabians". The superior culture and advanced knowledge of the Arabs in several branches of learning greatly influenced the Christian crusaders when they came in direct contact with the Arabs and the works of persons like Hermon the Cripple bear testimony to this influence of Arab culture.

Influence on the West

The Muslims, who were pioneers in almost all branches of learning led the West in diverse spheres of mediaeval thought. "The mission of mankind was accomplished by Muslims", writes George Sarton, The greatest philosopher, Al-Farabi was a Muslim; the greatest mathematicians, Abul Kamil and Ibrahim Ibn Sina were Muslims; the greatest geographer and encyclopaedist, Al-Musudi was a Muslim; the greatest historian, Al-Tabari was still a Muslim".

The influence of the Muslims could be traced in almost all spheres of life in the Mediaeval West including sciences and arts, commerce and industry, music and painting. The brightest luminaries of the Mediaeval times were Jabir, Kindi, Jahiz and Baytar in sciences; Zakariya Razi, Ibn Sina and Zahrawi in medical science; Khwarizmi, Omar Khayyam, Abul Wafa and Nasiruddin Toosi in mathematics and astronomy; Farabi, Ibn Sina, Ghazali, Ibn Rushd, Ibn Arabi and Fakhruddin Razi in philosophy; Tabari, Ibn Miskawayh, Ibn Athir and Ibn Khaldun in history; Masudi, Idrisi and Ibn Hauqal in geography; Farabi, Zalzal, Ziryab and Ibrahim Mausili in music; Behzad, Maani and Raza Abbasi in painting. They

have left behind on the pages of history the imprint of their genius in the respective branches of their activity. As already stated in detail in previous chapters a number of their works served as standard text books both in the West as well in the East till the beginning of the 18th century A.D.

The Arabs were the real originators of sciences in the world. Discarding the speculative method of the Greeks, they based their scientific research on observation and experiment which gave birth to experimental method. This experimental method introduced by the Arabs was in fact, responsible for rapid advancement of science during the mediaeval times. Jabir, the father of modern chemistry was the greatest chemical scientist of the mediaeval times whose writings influenced the course of Europeam alchemy and chemistry. The *Kitab Al-Haywan* written by Jahiz is an invaluable book on zoology containing germs of later theories on evolution, adoptation and animal psychology. Ibn Al-Baytar is universally acknowledged as the most eminent botanist of Mediaeval times. According to the *Historians' History*, it was from Ibn al-Haitham's *Twilight* that the illustrious Kepler took his ideas of atmospheric refraction and "it may be that Newton himself owes to the Arabs, rather than to the apple in his orchard at Woolsthorpe the first apperception of the system of the universe, for Muhammad Ben Musa seems, when writing his books on the movements of the celestial bodies and on the Force of Attraction, to have had an inkling of the great law of general harmony."

In medical science Al-Razi's *Al-Hawi* (*Continens*) in 20 volumes and *Al-Judari wal Hasbah* (a book dealing with small-pox) which ran into more than fifty editions during 1498—1866; Ibn Sina's (Avicenna's) *Al-Qanun Fi Tibb* (*Canon*) published 36 times and surgeon Zahrawi's *al-Tasrif* were recognised as the highest authority on medicine during the mediaeval era. Avicenna's influence on European medicine has been overwhelming.

In mathematics and astronomy, the works on algebra written by Khwarizmi and Omar Khayyam, books on geometry and trigonometry left behind by Abul Wafa, Nasiruddin Toosi and the treatises on astronomy by Khwarizmi, Omar Khayyam, Al-Beruni and Nasiruddin Toosi are the most outstanding contributions to these sciences during the middle ages. The translation of Khwarizmi's algebra marked the beginning of European algebra. The introduction of zero to arithmetic by the Arabs was a highly beneficial step towards the simplification of arithmetic.

The Muslims had specialised in historiography and political science which were their favourite subjects. Tabari, the father of Arabian historiography is considered as one of the greatest historians of the mediaeval era, who has influenced the art of writing history both in the East and the West. Ibn Khaldun, the founder of the science of sociology has the unique distinction of treating history as a science by supporting his facts with reasoning. More than any historian, Ibn Khaldun has influenced the modern thought in

historiography, politics, sociology and political economy.

Among the eminent travellers, explorers and navigators who brought the distant parts of Mediaeval world closer through their discoveries and writings are Ibn Batuta, Masudi, Beruni, Ibn Hauqal, Moqaddasi, Sulaiman Al-Mahiri and Ibn Majid. They also paved the way for the growth of Arabian commerce which was carried on with distant parts of the known world both through land and sea routes. The products of the highly developed industries in Muslim countries found good market throughout the world.

In fine arts and music too, Muslim artists influenced their European counterparts and the musicians Farabi, Ishaq Mausili, Zalzal and Ziryab; the painters Maani and Behzad were the greatest figures of their time in the respective spheres of their arts. Muslims had developed a distinctive style of their own in architecture and built some of the most magnificent and beautiful buildings in the world including Alhambra, the Grand Mosque of Cordova in Spain, mosque of Ibn Tulun in Cairo, the grand mosque of Isfahan and the Taj Mahal of Agra. These are even now recognised as the architectural wonders of the world.

Thus the Muslims kept aloft the candle of civilization during the Mediaeval era and their contributions to the advancement of human progress provided the necessary link between the ancient and modern civilizations. The Islamic universities of Nizamiyah and Mustansariya at Baghdad, the Al-Azhar of

Cairo, and the universities of Cordova and Salerno diffused knowledge to students composed of all communities who flocked to these seats of learning from distant parts of the world including Europe.

The four factors

The four factors, which are generally recognised by European Historians as the basis of Western Renaissance are (1) The recovery of Greek Classics, (2) The diminution of ecclesiastical authority, (3) The discovery of the New World and (4) The introduction of the Printing Press. But curiously enough these factors are more or less resulted from the impact of Islamic culture with the west. The Islamic influence may easily be trace in the birth and growth of these factors which are said to have brought about the renaissance in Europe.

As regards the Greek Classics, it is universally admitted both in the East and the West that it were the Arabs who patronised and saved them from total extinction. Hence the Greek classics existed in Arabic version only, which were later translated by the Christian scholars into European languages The *Historians' History* admits, "They (Arabs) merit eternal gratitude for having been the preserver of the learning of Greeks and Hindus when those people were no longer producing anything and Europe was still too ignorant to undertake the charge of the precious Depot. Efface the Arabs from history and the Renaissance of letters will be retarded in Europe by several centuries". Writing in the *History of Me-*

dicine in the Middle Ages, Max Kahn observes, "The tolerance of Arabs was the saving grace of civilization. They relit the lamp of learning which had been extinguished in Europe, and the light of Hippocrates, Aristotle and Galen illuminated the mosques and cloisters of infidels".[1] According to Dr. F. J. C. Hearnshaw, writer of the Chapter on "European Life and Manners" in Vol. 6 of the *Universal History of the World*, "Christian students repaired to Islamic schools to learn the wisdom of the ancients and to gain the secrets of those arts and crafts which made Muhammedan Spain famous throughout the world. It was by way of Spain that the long lost works of Aristotle reached Western Christendom, to revolutionise scholastic Philosophy and Theology." According to Stanley Lane-Poole "What mediaeval Europe knew of Greek Philosophy, Mathematics, Chemistry, Astronomy and Medicine was learned principally through Latin translations from Arabic treatises which held their places in the schools of Europe down to the sixteenth and even well into the seventeenth century." (Chapter on "Golden Age of Arab Culture" in Vol. IV. of the *Universal History of the World*).

The second factor namely the diminution of religious authority in the Christian authority was caused by Reformation and Crusades. Martin Luther, who was the founder of Reformation was so much influenced by Islamic culture that he was accused of being a Muhammadan by the orthodox Christians. The Crusaders, hailing from different parts of Christian

[1] 'History of Medicine in the Middle Ages', Vol. I, Chapter II, by Max Kahn.

Europe came in direct contact with Muslims in the Holy Land and were deeply influenced by the Islamic culture. On return they introduced those reforms to their life which greatly weakened the hold of the Church on the common Christian. Dr. B. W. Stevenson says in the Chapter on "The Spirit and Influence of the Crusades" in Volume 3 of *The Universal History of the World* (7 Vols., London, 1928): "The learning and art and science of the East, its public services and methods of government, its highly developed industries and the superior luxury and comfort of the domestic life of its upper classes, exerted a powerful and far-reaching influence upon Europe in the Crusading period." Another historian of the Crusades, Dr. Henry Elmer Barnes, says in Vol. I. of his *History of Western Civilisation*: "The Westerners learned many Muslim and Oriental ways and developed a taste for the luxuries of the region. All this promoted a demand for Eastern goods and accelerated the growth of commerce. The Italians, who had acted as transporting agents for the Crusaders, took full advantage of their opportunities to build up trading relations with the East. Travel was promoted, and the explorations of Marco Polo and others followed on the heels of the Crusaders. This still further encouraged trade between Europe and the Orient. The revived trade promoted the rise of towns and a more progressive element in European life. The science and culture of the Muslims were brought back to Europe and helped to create the remarkable intellectual revival of the twelfth and thirteenth centuries".

The third factor namely the discovery of America was actually the outcome of Arab efforts. The latest researches carried on by Dr. Jeffrey, the celebrated anthropologist of South Africa has proved that Arabs discovered America five centuries ahead of C. Columbus.

The fourth factor namely the invention of the Printing Press is also indirectly connected with the introduction and large scale production of paper in Europe by the Arabs. Without paper there would have been no Printing Press.

THE END

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